

US009921793B2

(12) **United States Patent
Park**

(10) **Patent No.: US 9,921,793 B2**
(45) **Date of Patent: Mar. 20, 2018**

(54) **DISPLAY DEVICE AND CONTROLLING
METHOD THEREOF**

(71) Applicant: **LG ELECTRONICS INC.**, Seoul
(KR)

(72) Inventor: **Chala Park**, Seoul (KR)

(73) Assignee: **LG Electronics Inc.**, Seoul (KR)

(*) Notice: Subject to any disclaimer, the term of this
patent is extended or adjusted under 35
U.S.C. 154(b) by 0 days.

(21) Appl. No.: **15/053,216**

(22) Filed: **Feb. 25, 2016**

(65) **Prior Publication Data**

US 2017/0068497 A1 Mar. 9, 2017

(30) **Foreign Application Priority Data**

Sep. 3, 2015 (KR) 10-2015-0124966

(51) **Int. Cl.**

G06F 3/14 (2006.01)
G06F 3/048 (2013.01)
G06F 9/44 (2018.01)
H04N 21/41 (2011.01)
H04N 21/43 (2011.01)

(Continued)

(52) **U.S. Cl.**

CPC **G06F 3/1423** (2013.01); **G06F 3/048**
(2013.01); **G06F 9/4443** (2013.01); **H04N**
21/4126 (2013.01); **H04N 21/4307** (2013.01);
H04N 21/4363 (2013.01); **H04N 21/4532**
(2013.01); **H04N 21/4882** (2013.01); **G06F**
9/44505 (2013.01); **G09G 2370/025** (2013.01);

(Continued)

(58) **Field of Classification Search**

CPC G06F 3/048; G06F 3/14; G06F 3/1423;

G06F 9/4443; G06F 9/44505; H04N
21/4126; H04N 21/4307; H04N 21/4363;
H04N 21/4532; H04N 21/4882; G09G
2370/025; G09G 2370/027; G09G
2370/06; G09G 2370/10

See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

9,591,339 B1 * 3/2017 Christie H04N 21/2541
9,641,870 B1 * 5/2017 Cormie H04N 21/23424
(Continued)

FOREIGN PATENT DOCUMENTS

EP 2 521 374 11/2012

OTHER PUBLICATIONS

European Search Report dated Feb. 10, 2017 issued in Application
No. 15003550.9.

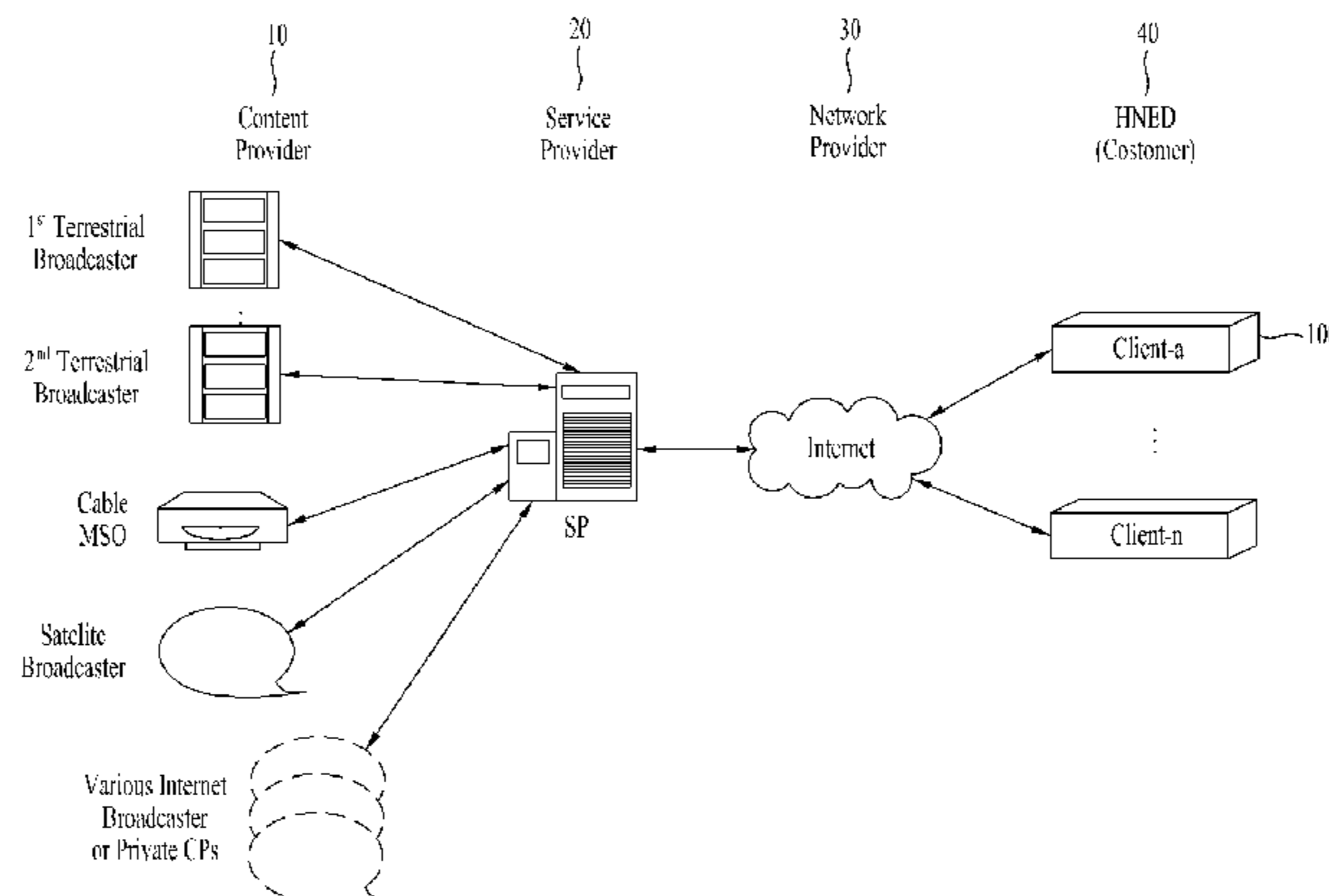
Primary Examiner — Dmitriy Bolotin

(74) *Attorney, Agent, or Firm* — KED & Associates LLP

(57) **ABSTRACT**

Disclosed are a display device and controlling method thereof. The present invention includes a display unit configured to display a first content, a communication unit configured to connect communications with a plurality of external mobile terminals, and a controller configured to obtain personalization information corresponding to each of a plurality of the external mobile terminals, recognize an occurrence of an event related to the personalization information of a specific one of a plurality of the external mobile terminals, control the communication unit to transmit a signal indicating the event occurrence to the specific external mobile terminal, control the communication unit to receive a command signal for controlling the display device from the specific external mobile terminal.

10 Claims, 22 Drawing Sheets



- (51) **Int. Cl.**
H04N 21/4363 (2011.01)
H04N 21/45 (2011.01)
H04N 21/488 (2011.01)
G06F 9/445 (2018.01)

- (52) **U.S. Cl.**
CPC ... *G09G 2370/027* (2013.01); *G09G 2370/06*
(2013.01); *G09G 2370/10* (2013.01)

(56) **References Cited**

U.S. PATENT DOCUMENTS

2010/0083304 A1 4/2010 Pan
2011/0185437 A1* 7/2011 Tran H04L 63/104
726/28
2013/0027613 A1* 1/2013 Kim H04N 21/4126
348/563
2015/0271551 A1* 9/2015 Lee H04N 21/458
725/34

* cited by examiner

FIG. 1

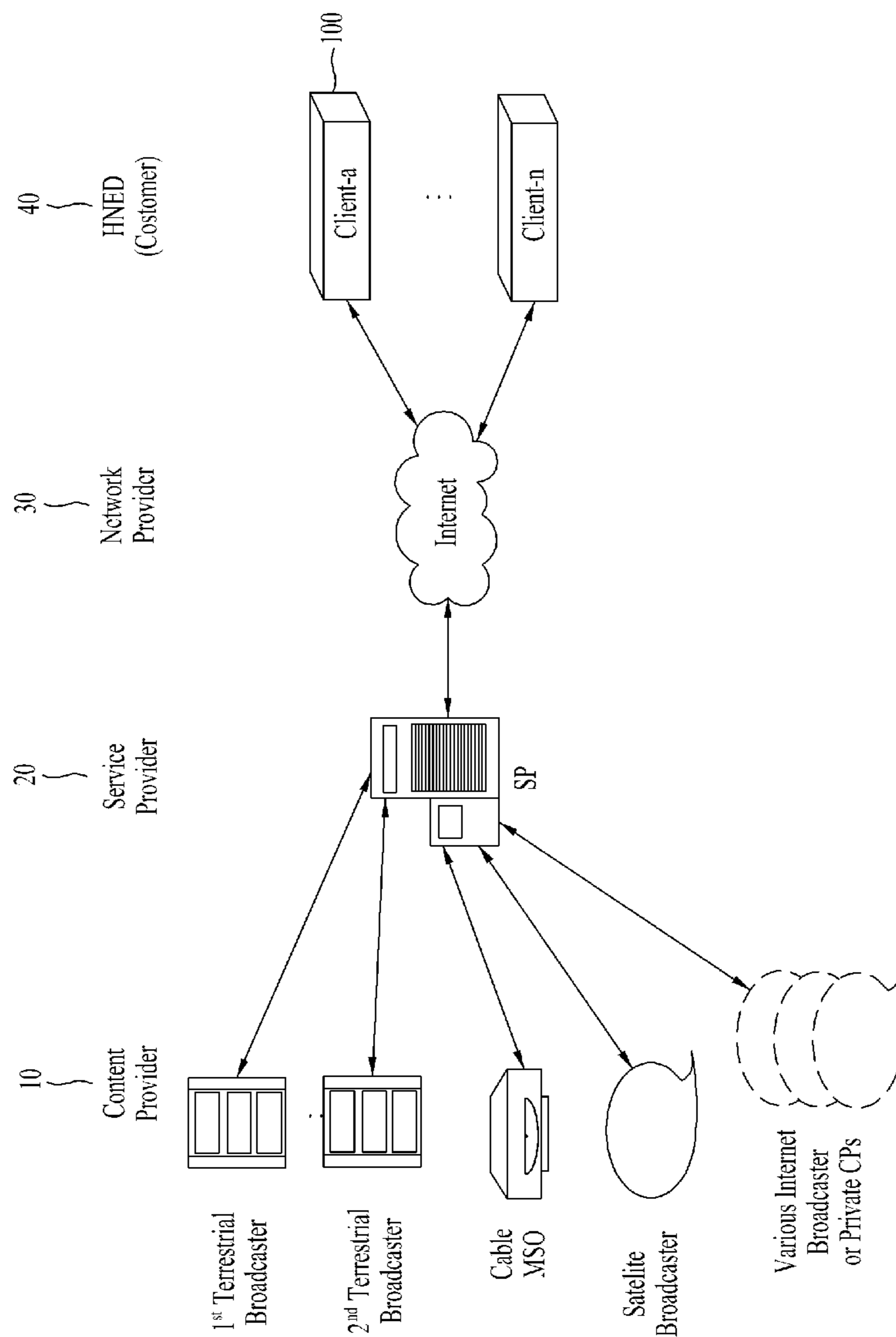


FIG. 2

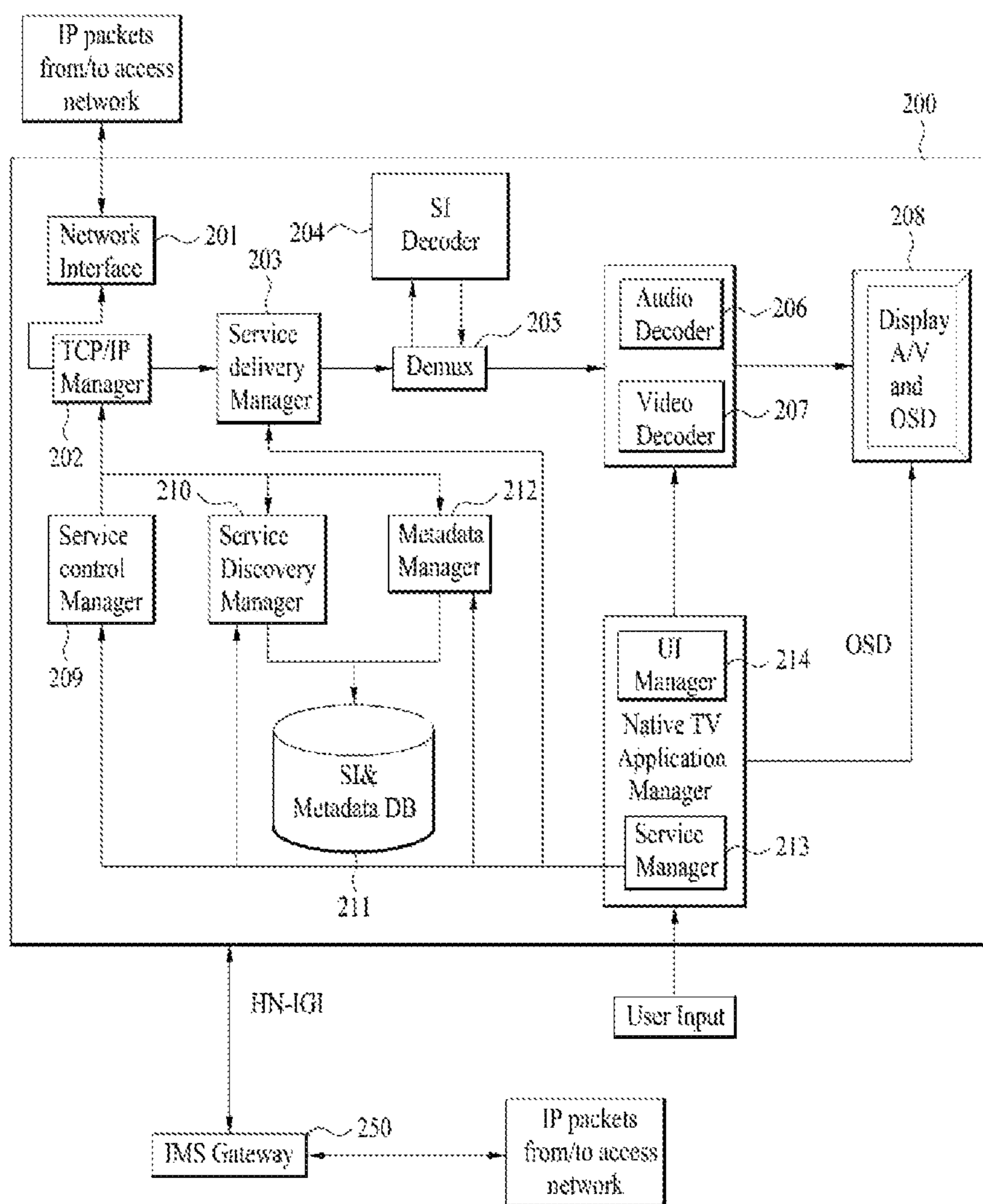


FIG. 3

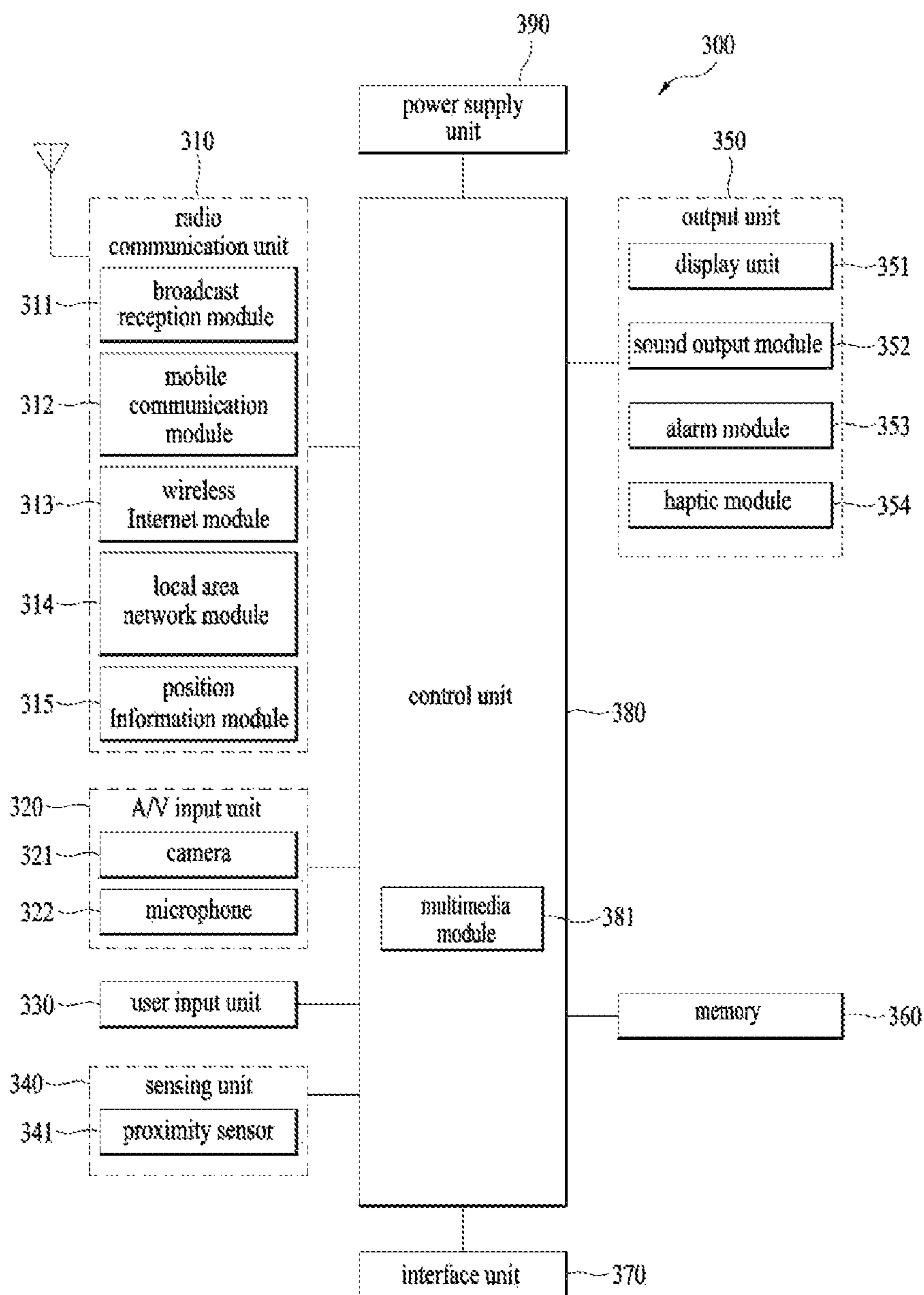


FIG. 4

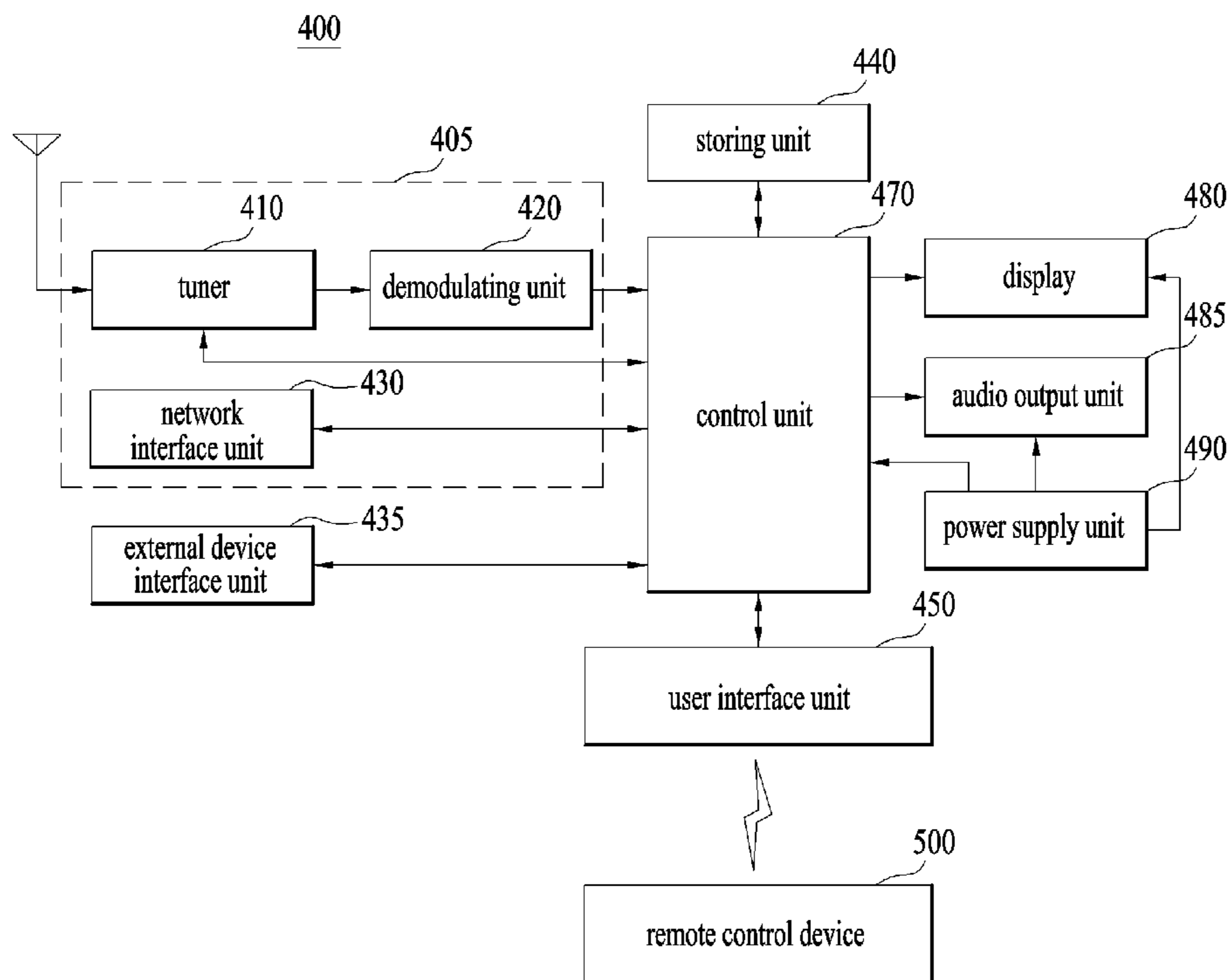


FIG. 5

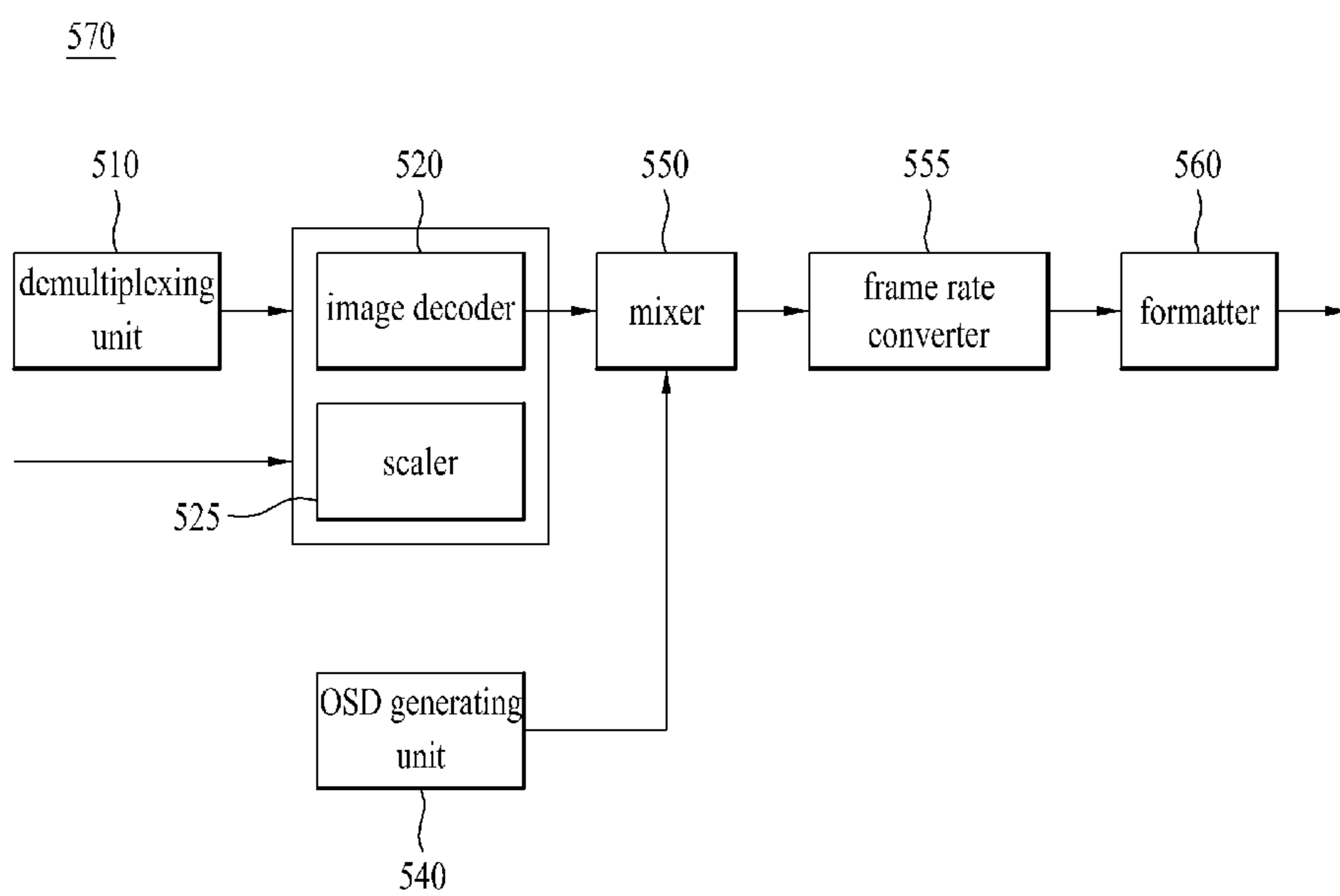


FIG. 6

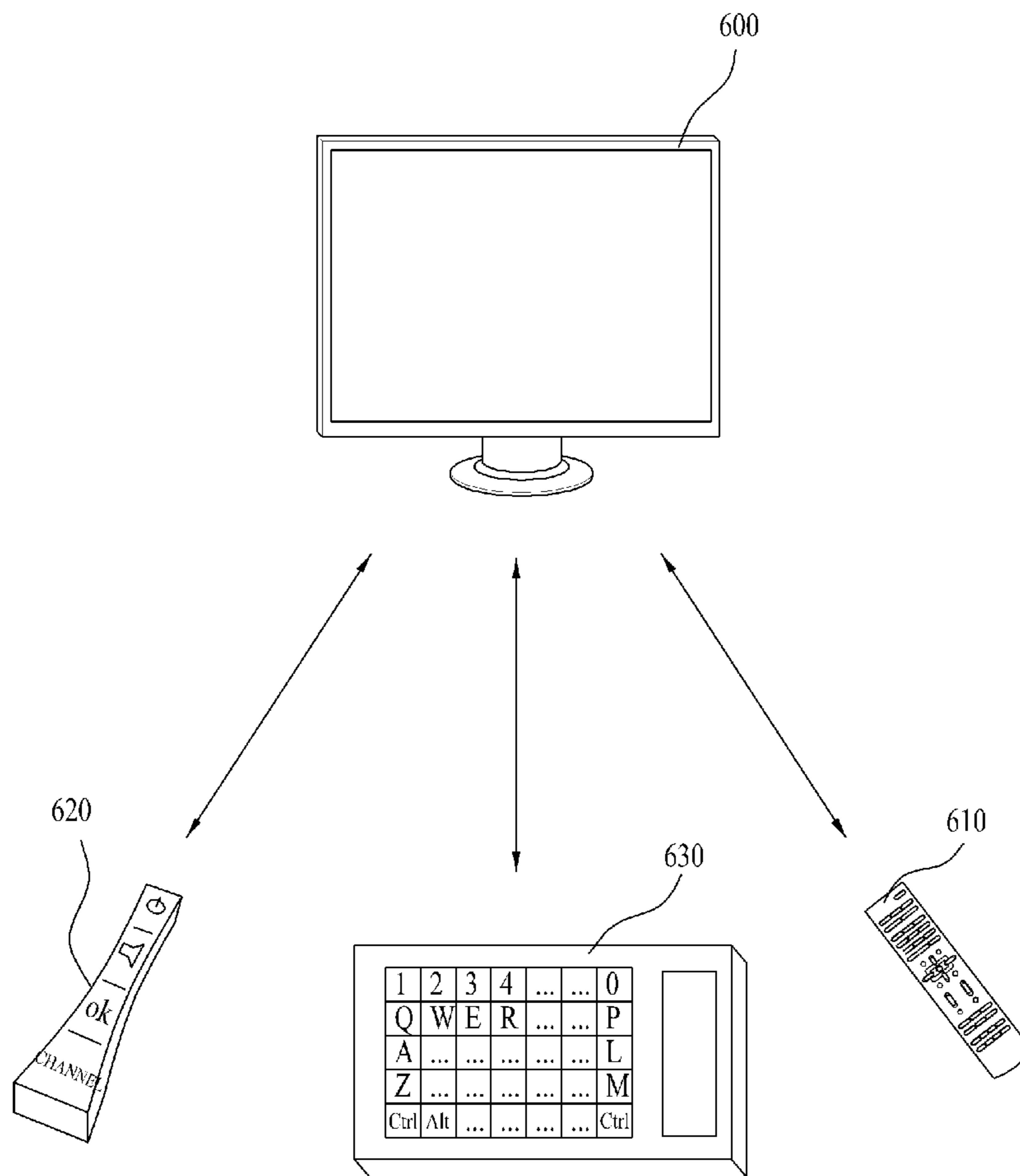


FIG. 7

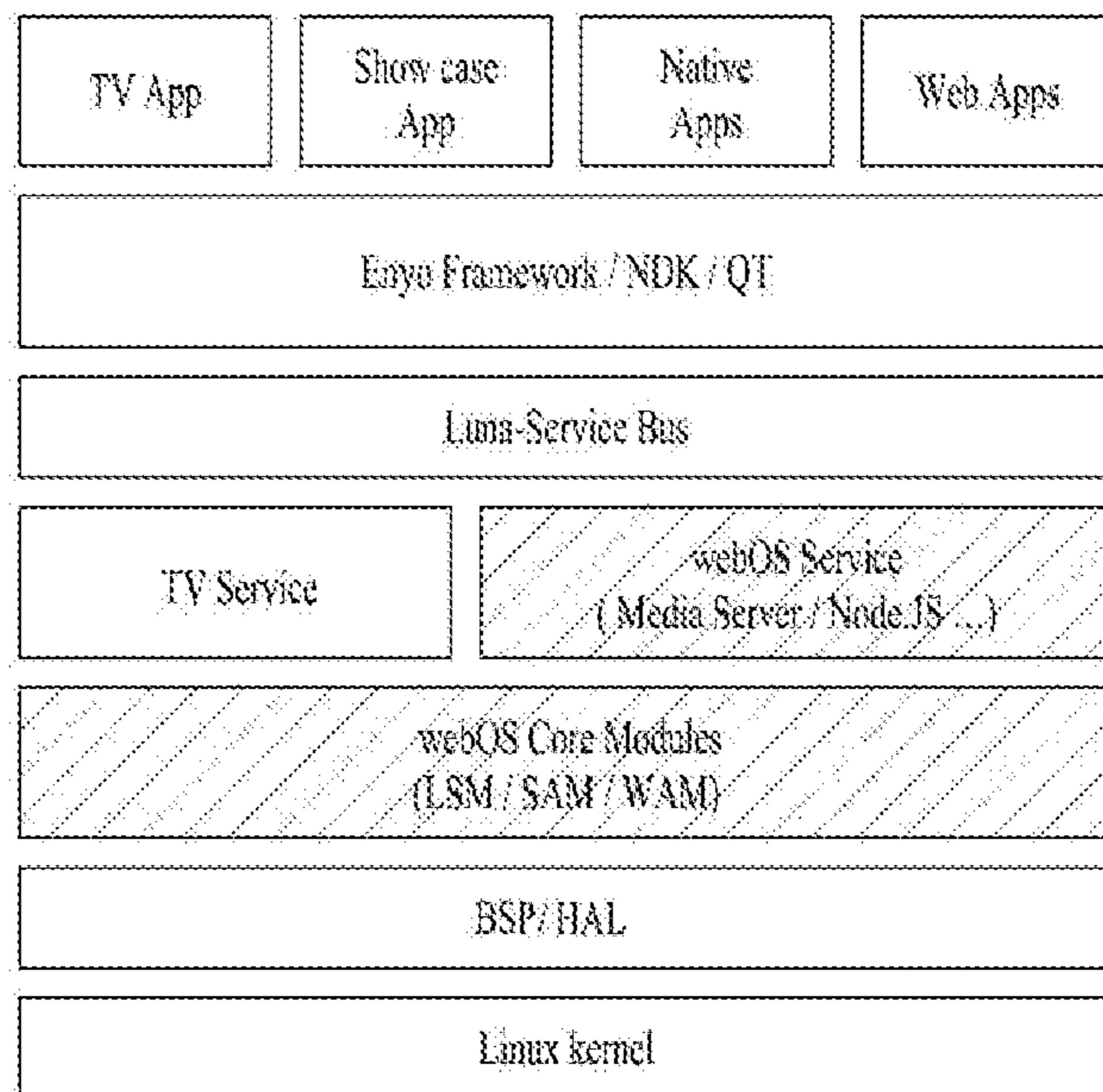


FIG. 8

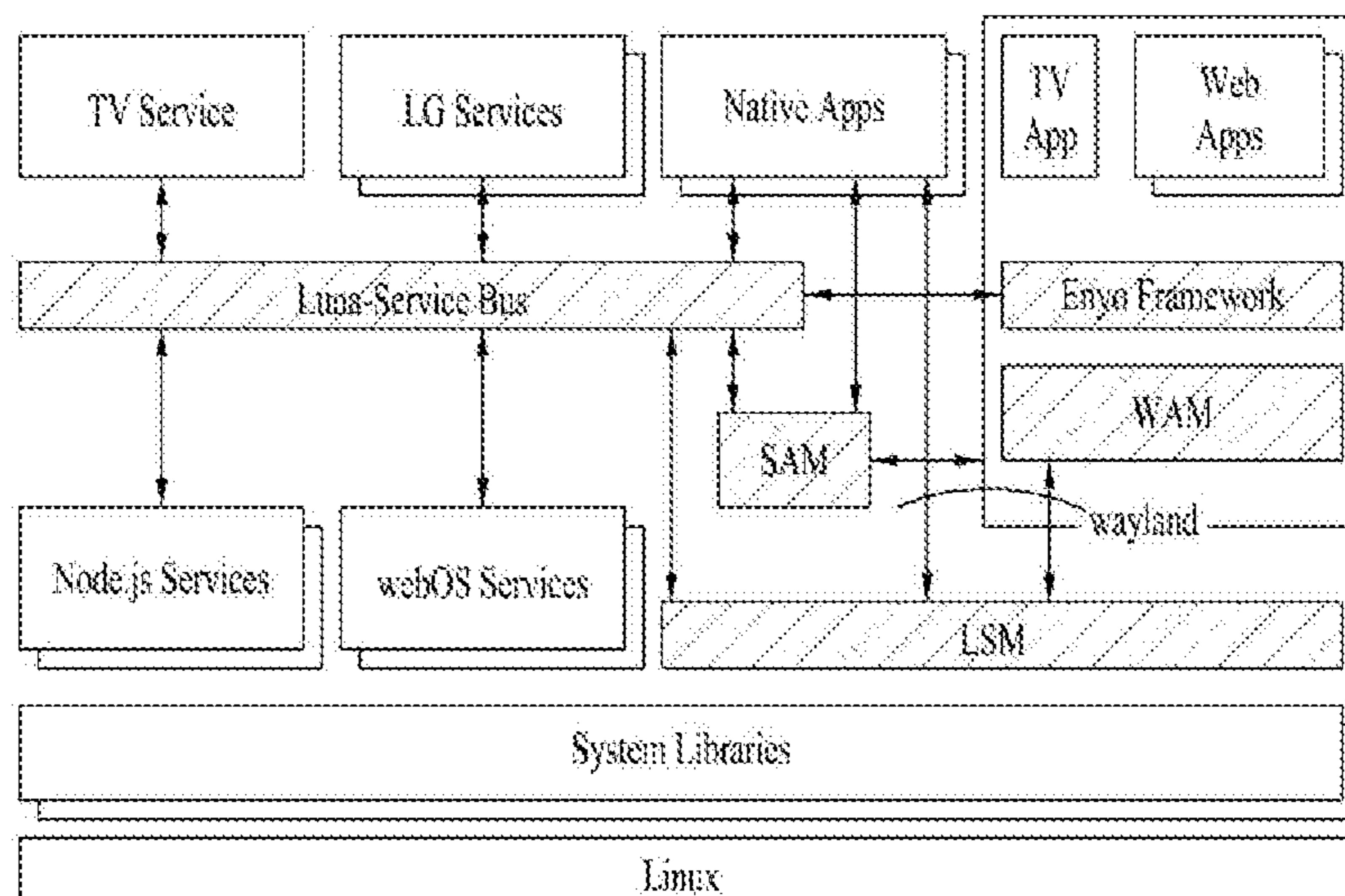


FIG. 9

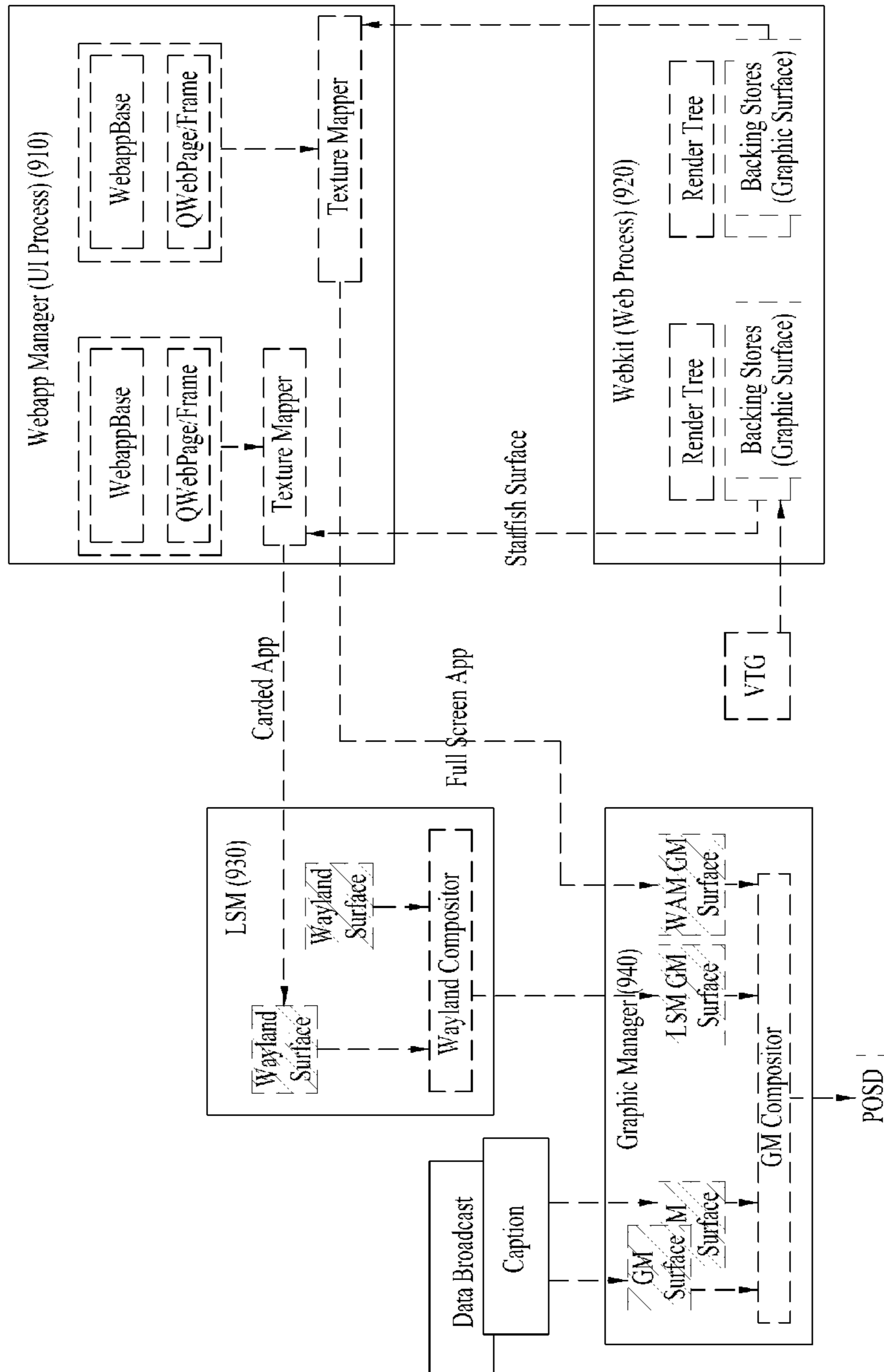


FIG. 10

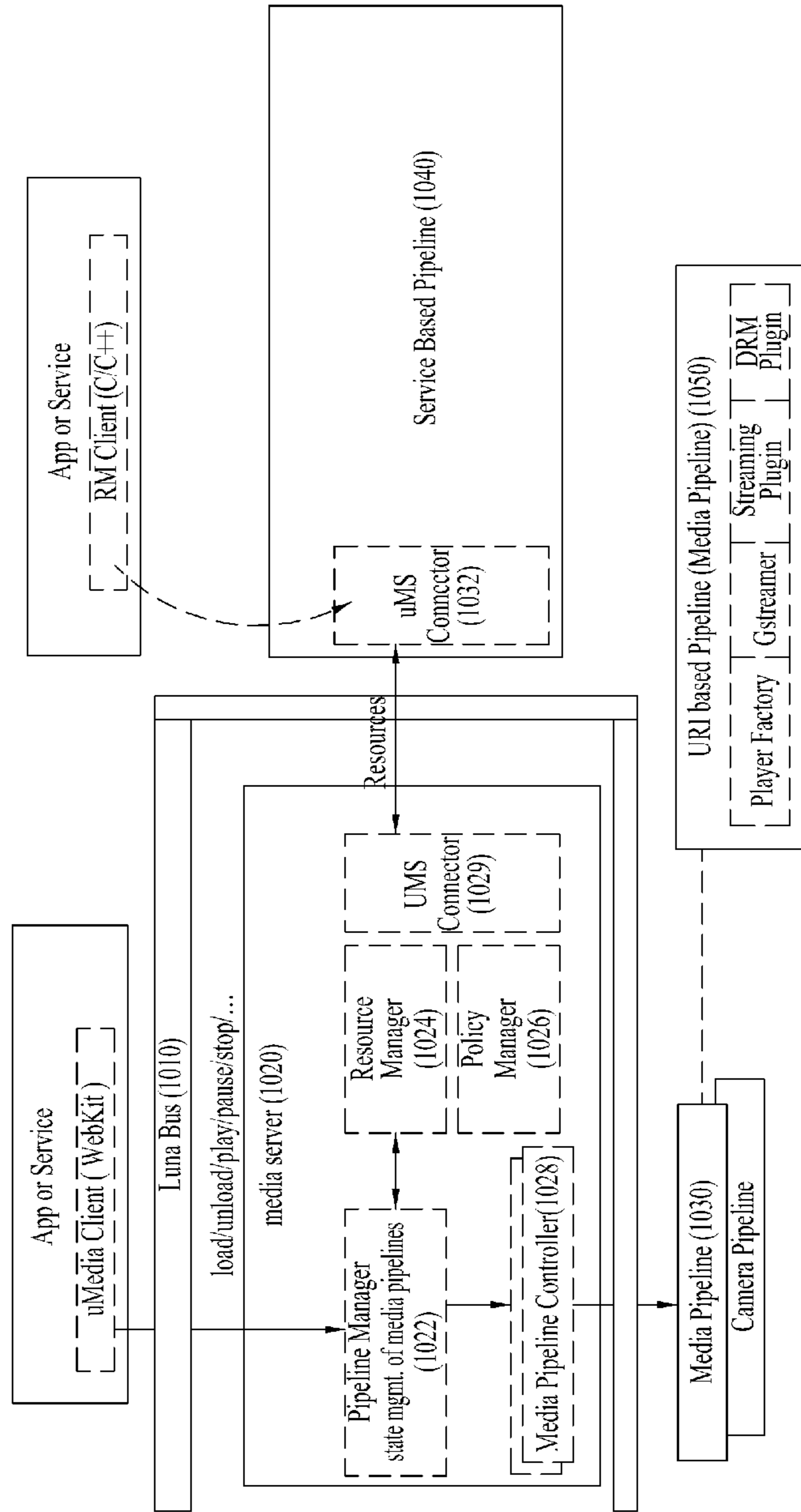


FIG. 11

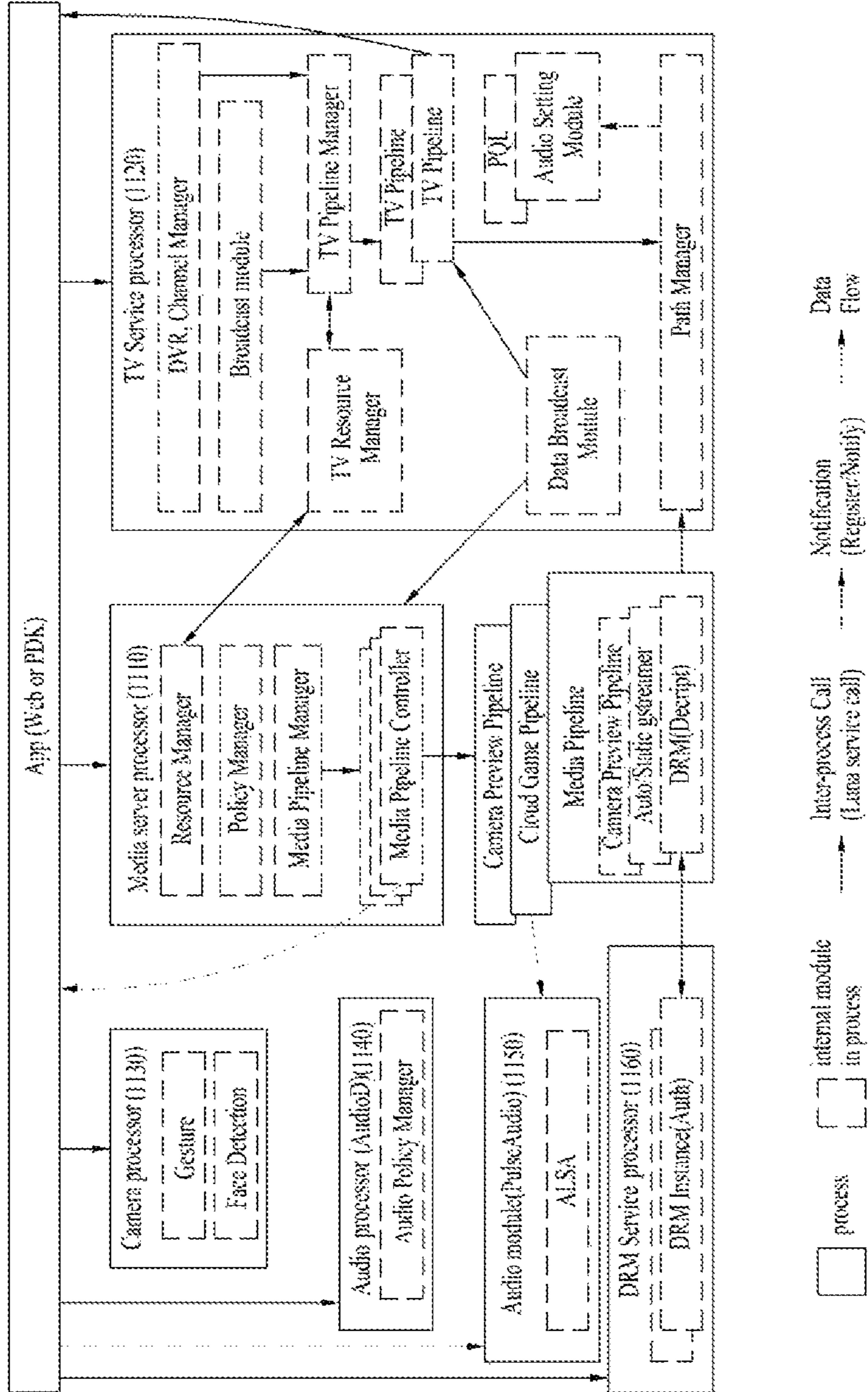
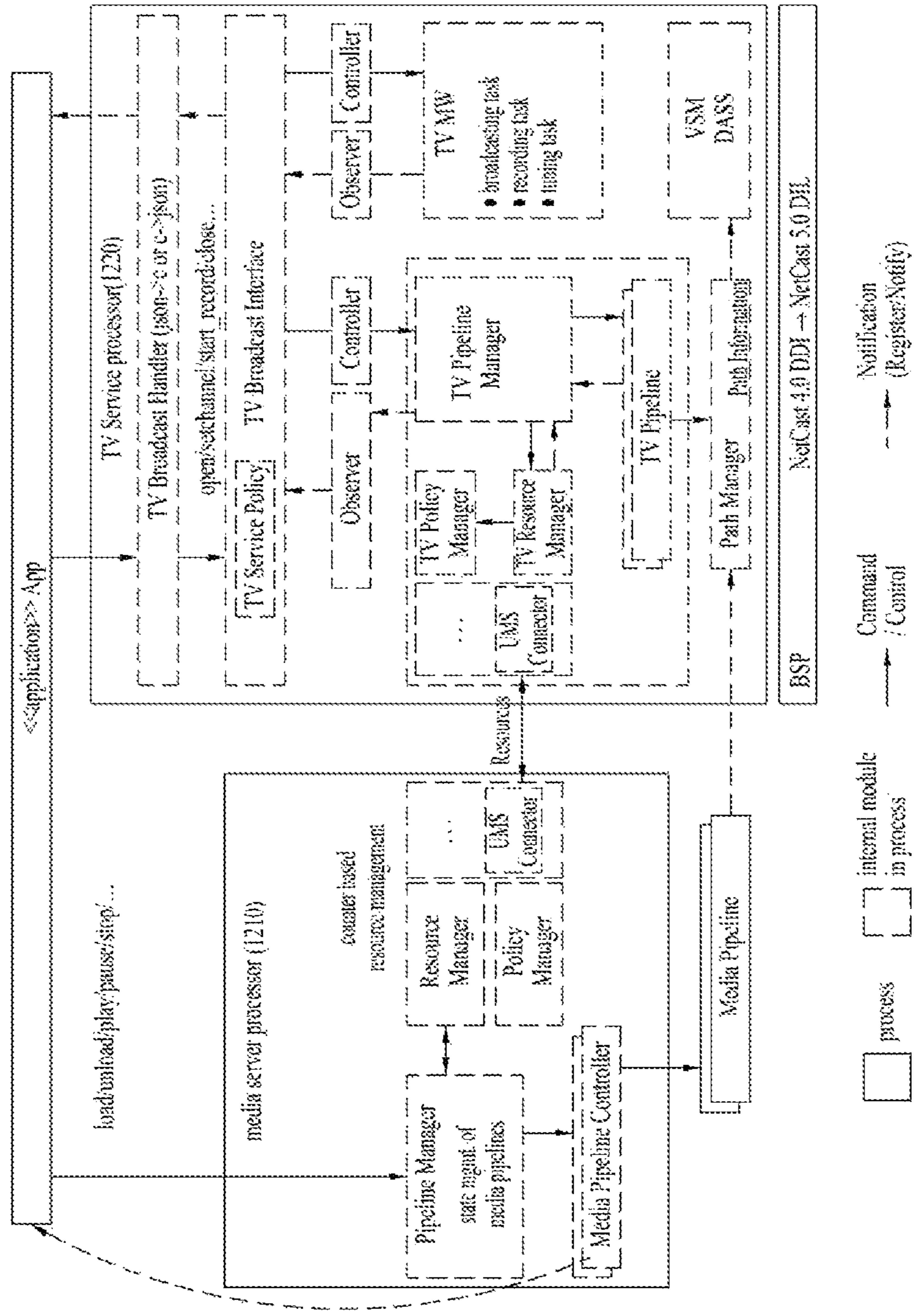


FIG. 12



<<application>> App

load/unload/play/pause/stop/...

media server processor (1210)

resource management

Pipeline Manager

state mgmt. of media pipelines

Media Pipeline Controller

Resource Manager

Policy Manager

UMS Connector

Media Pipeline

TV Service processor (1220)

TV Broadcast Handler (json->c or c->json)

open/setchannel/start recording/close...

TV Service Policy

TV Broadcast Interface

Observer

Controller

TV Policy Manager

TV Resource Manager

TV Pipeline Manager

TV Pipeline

Observer

Controller

UMS Connector

Path Manager

Path Information

TV MW

broadcasting task

recording task

tuning task

VSM

DASS

NetCast 4.0 DDI -> NetCast 5.0 DDI

process

internal module

in process

Command / Control

Notification (Register/Notify)

FIG. 13

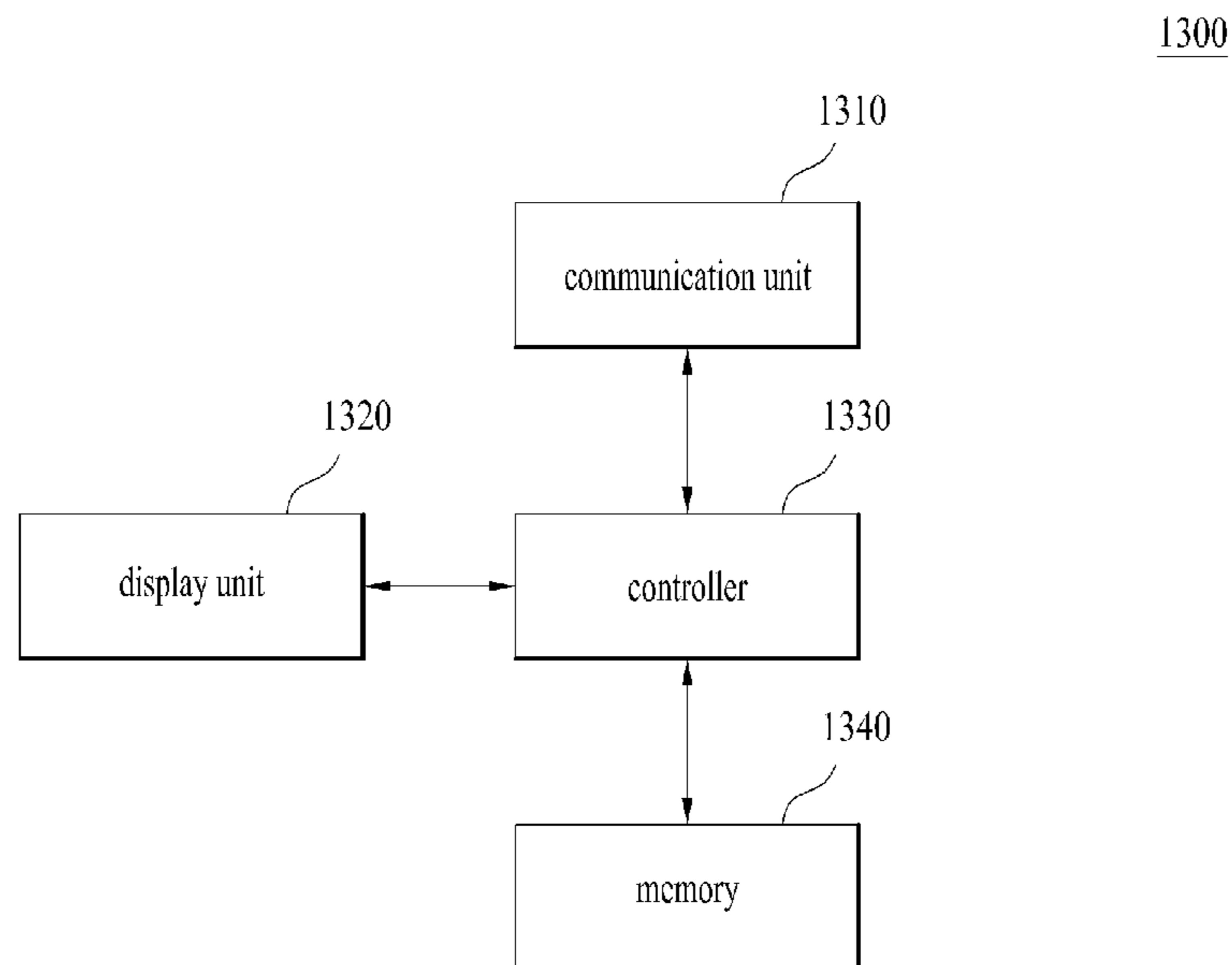


FIG. 14

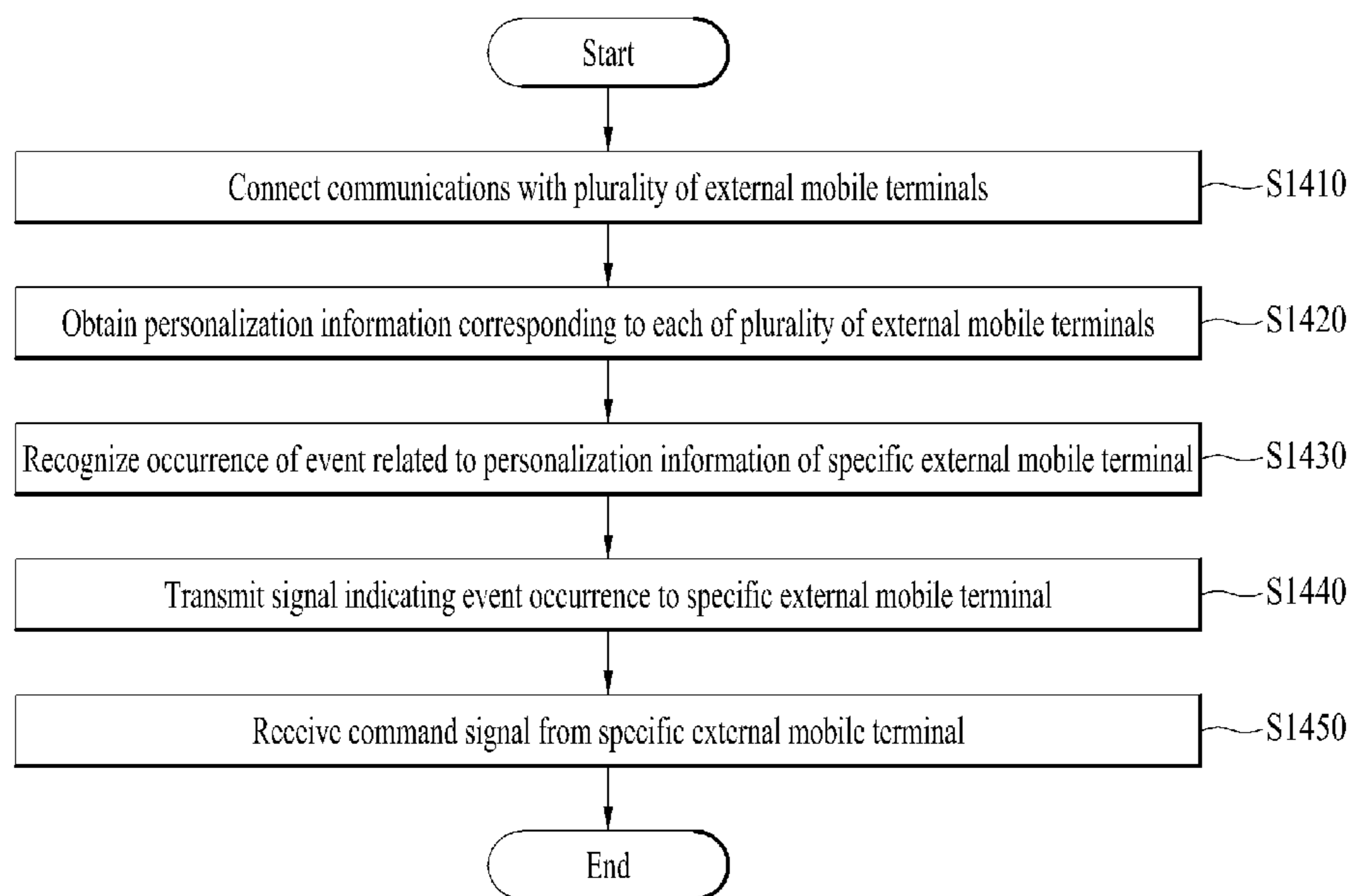


FIG. 15

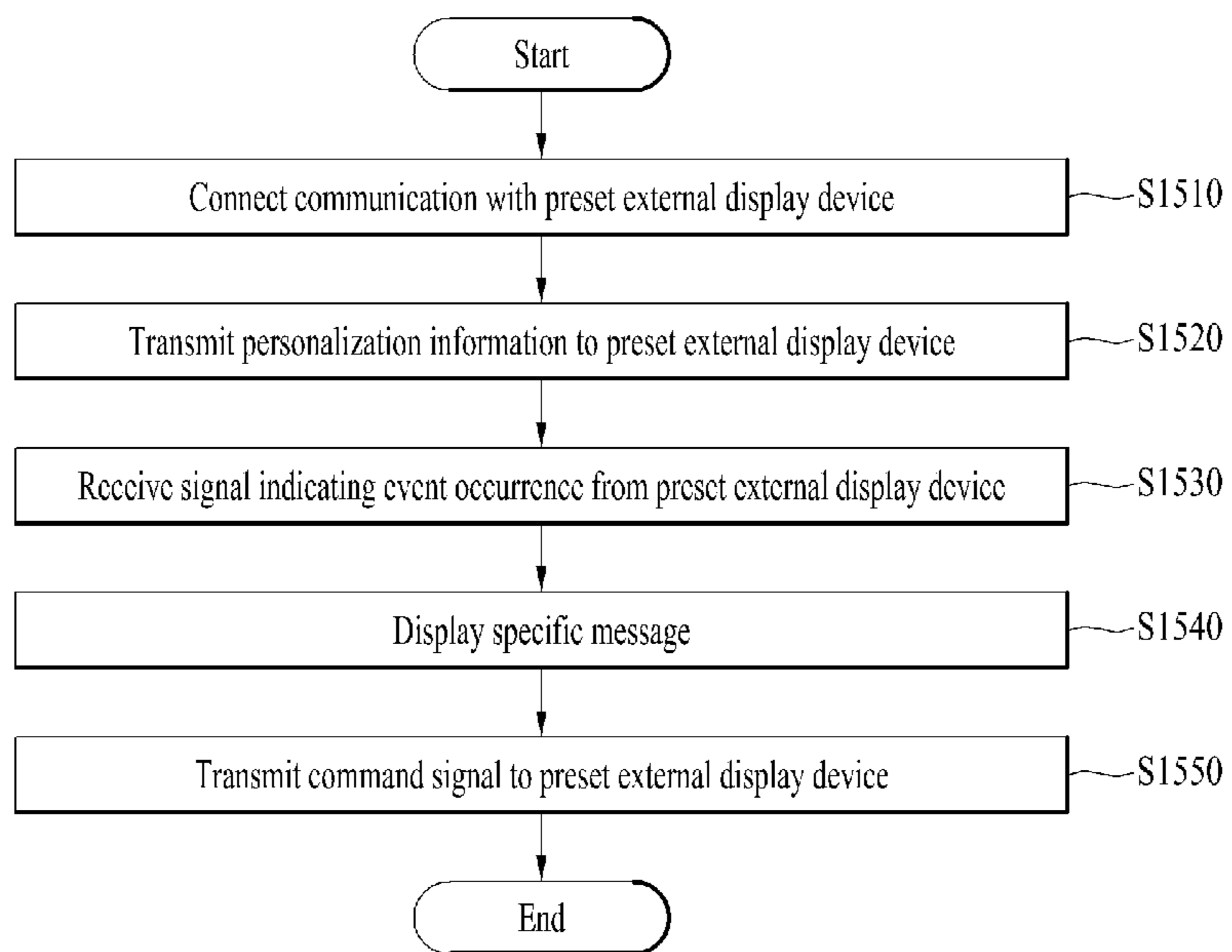


FIG. 16

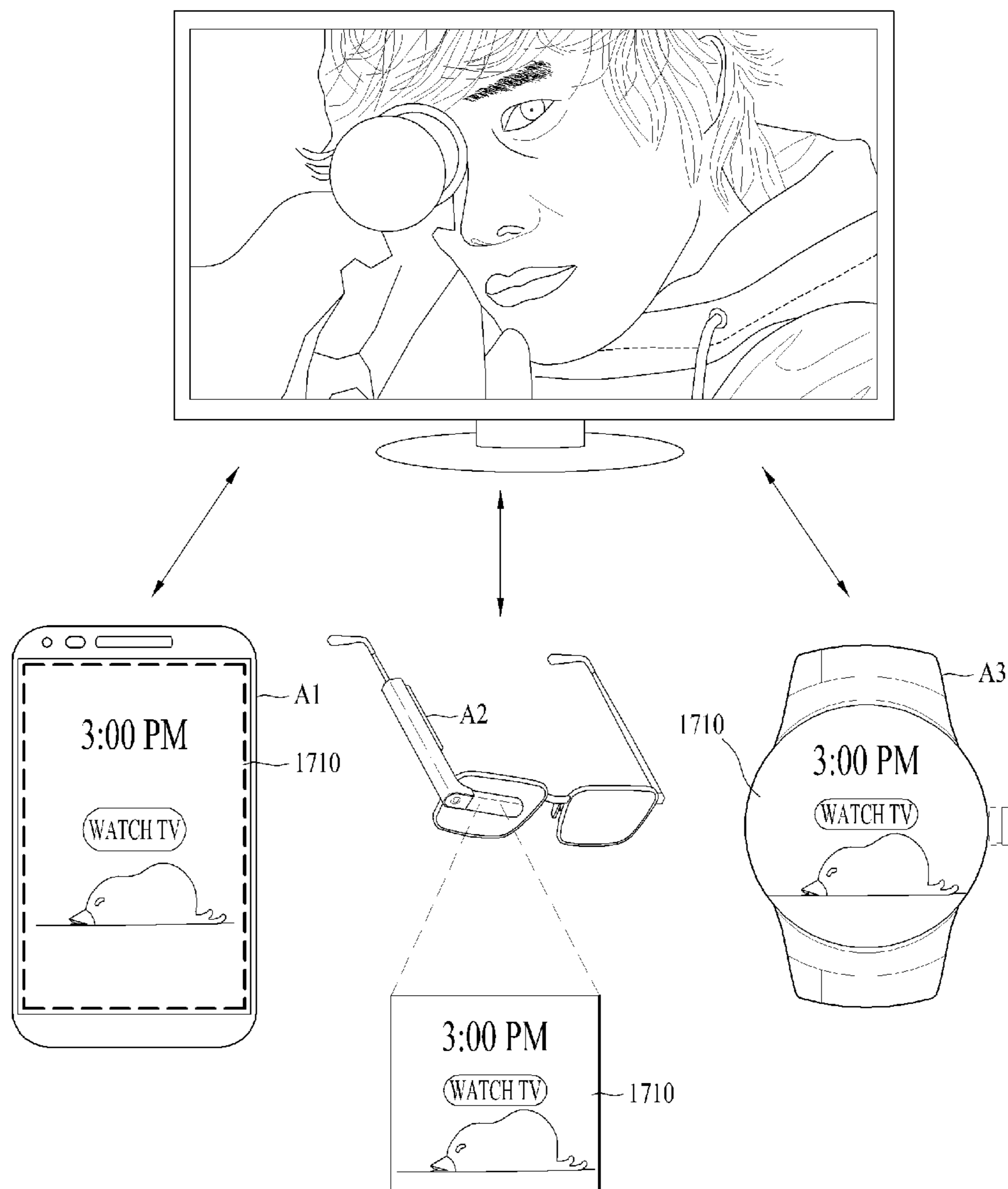


FIG. 17

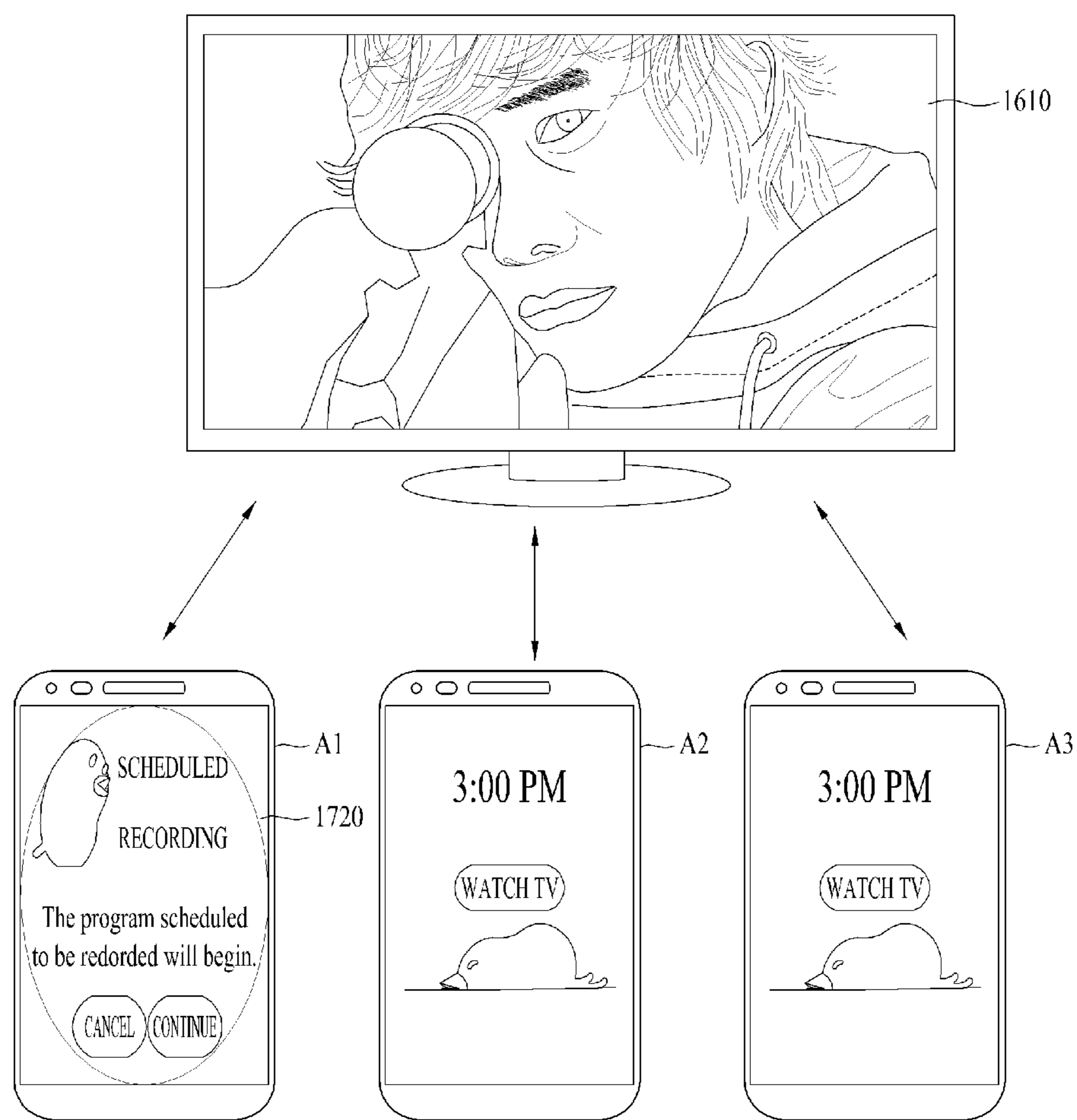


FIG. 18

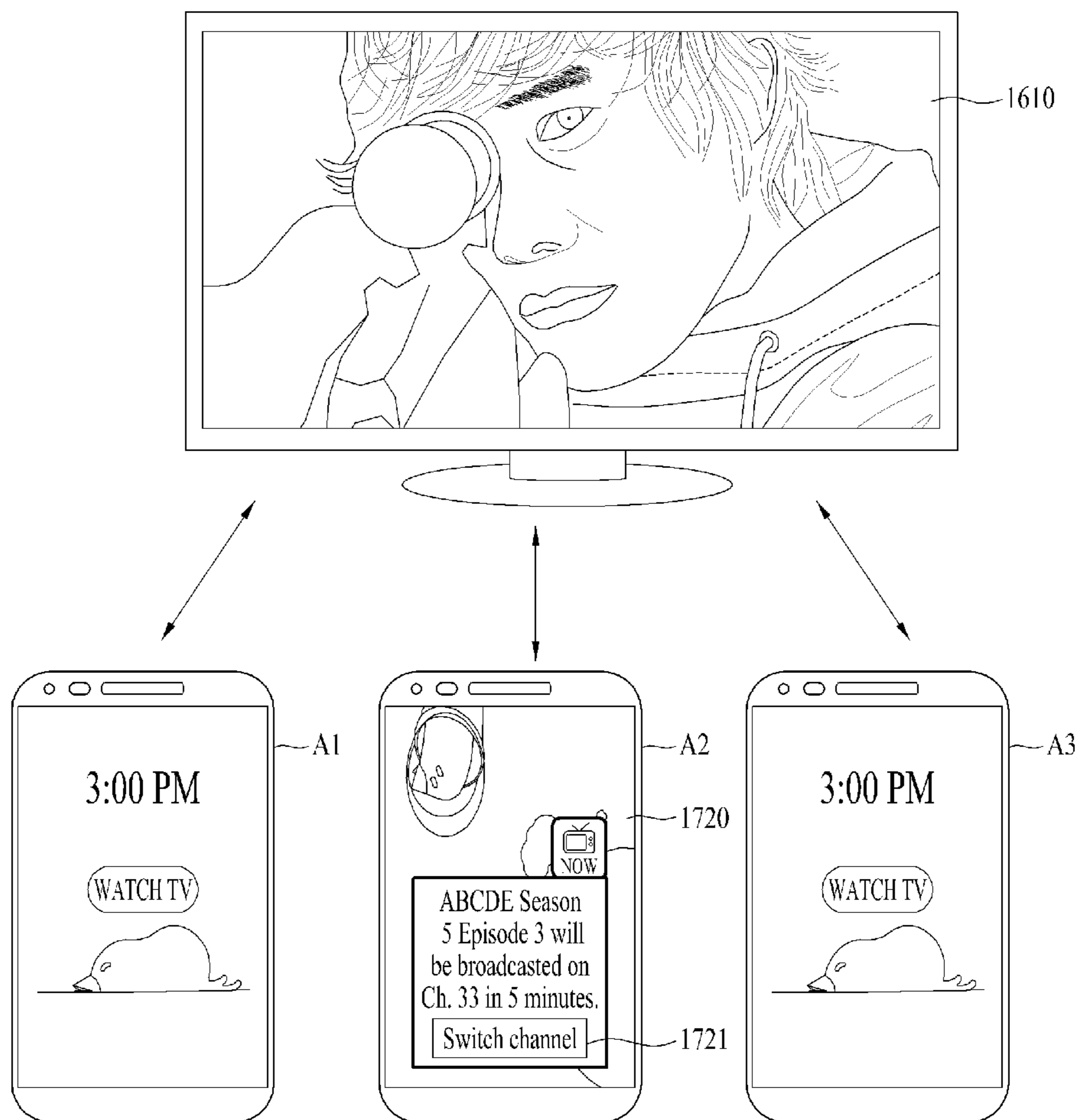


FIG. 19

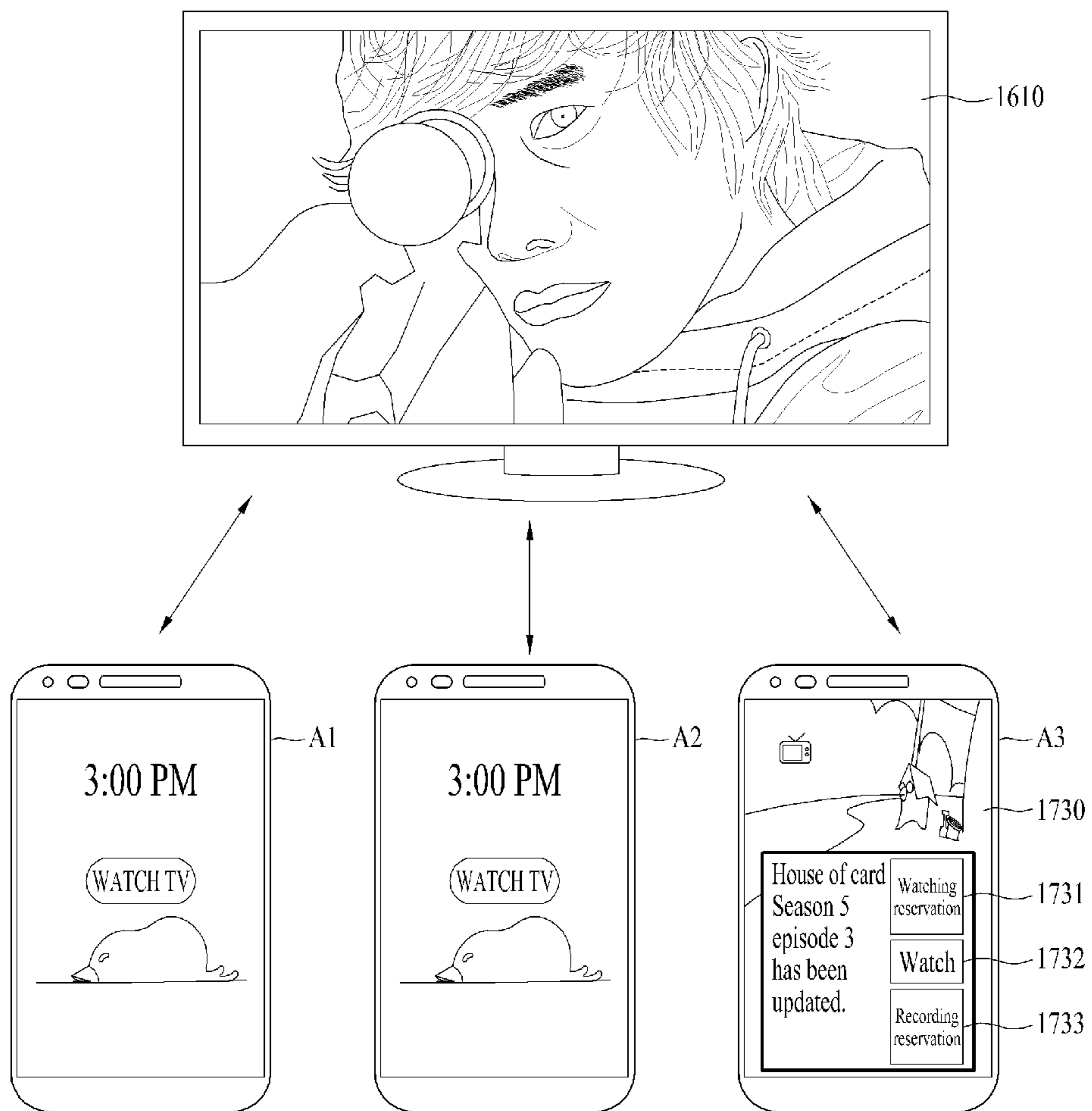


FIG. 20

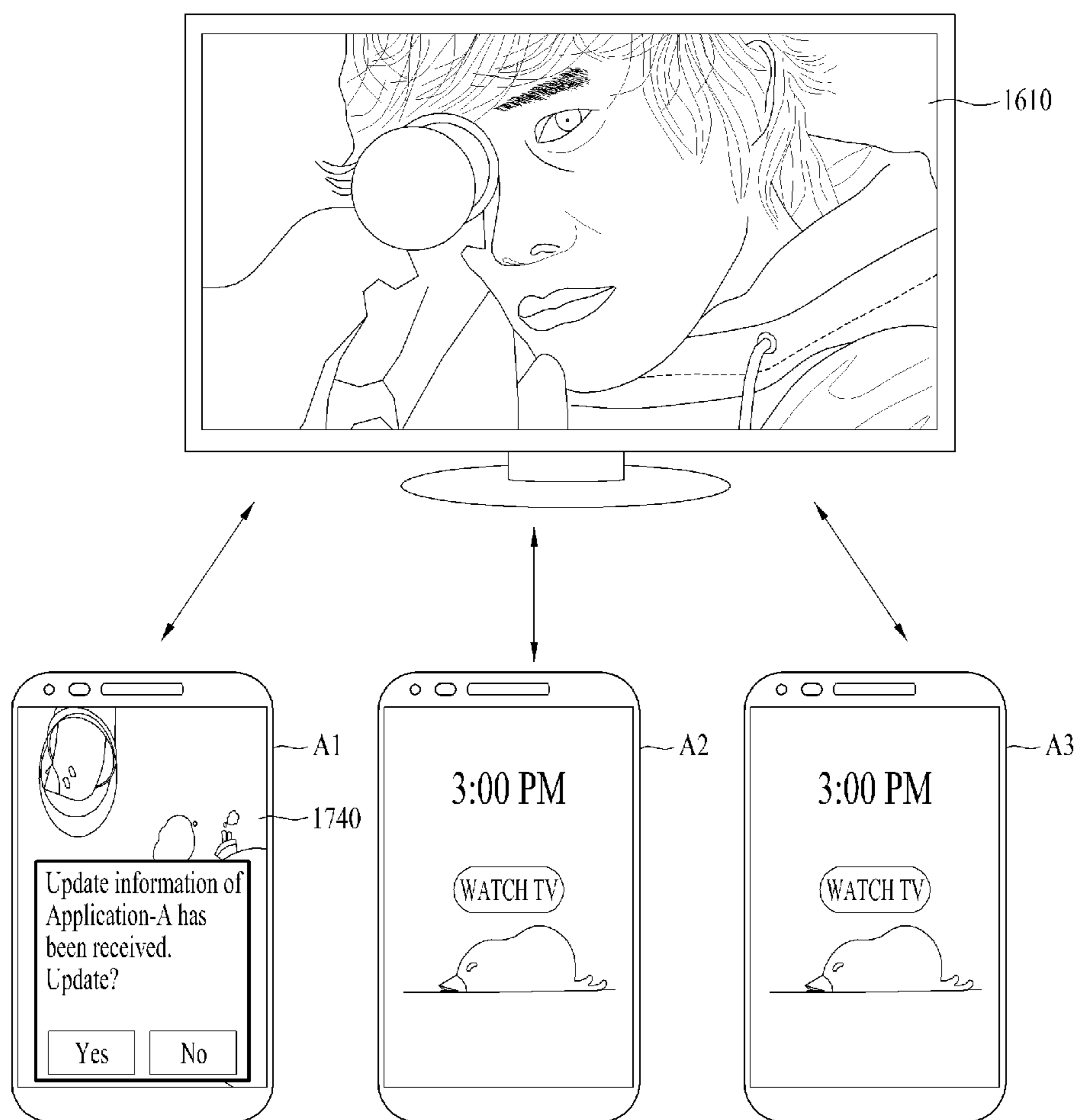


FIG. 21

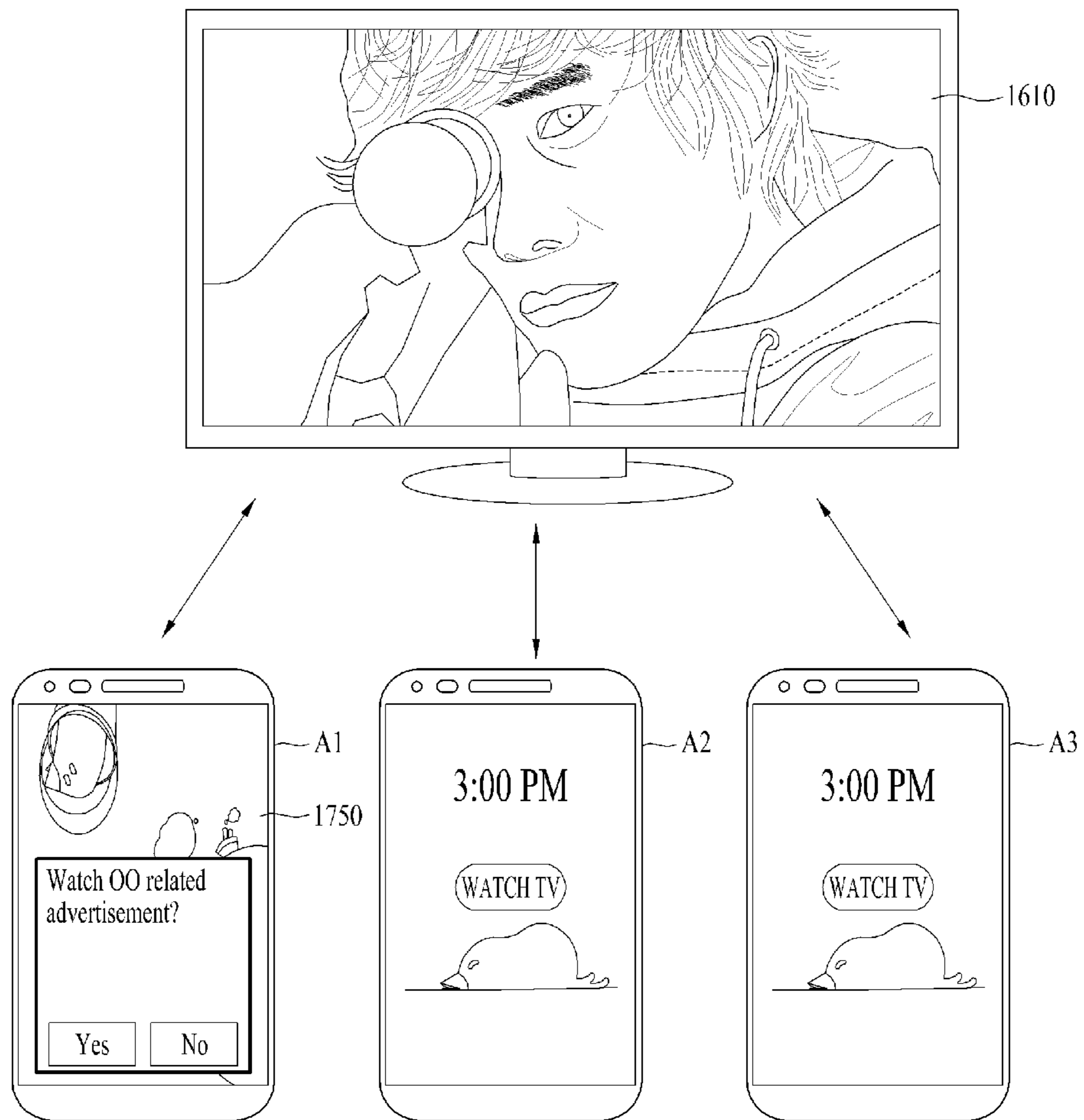


FIG. 22

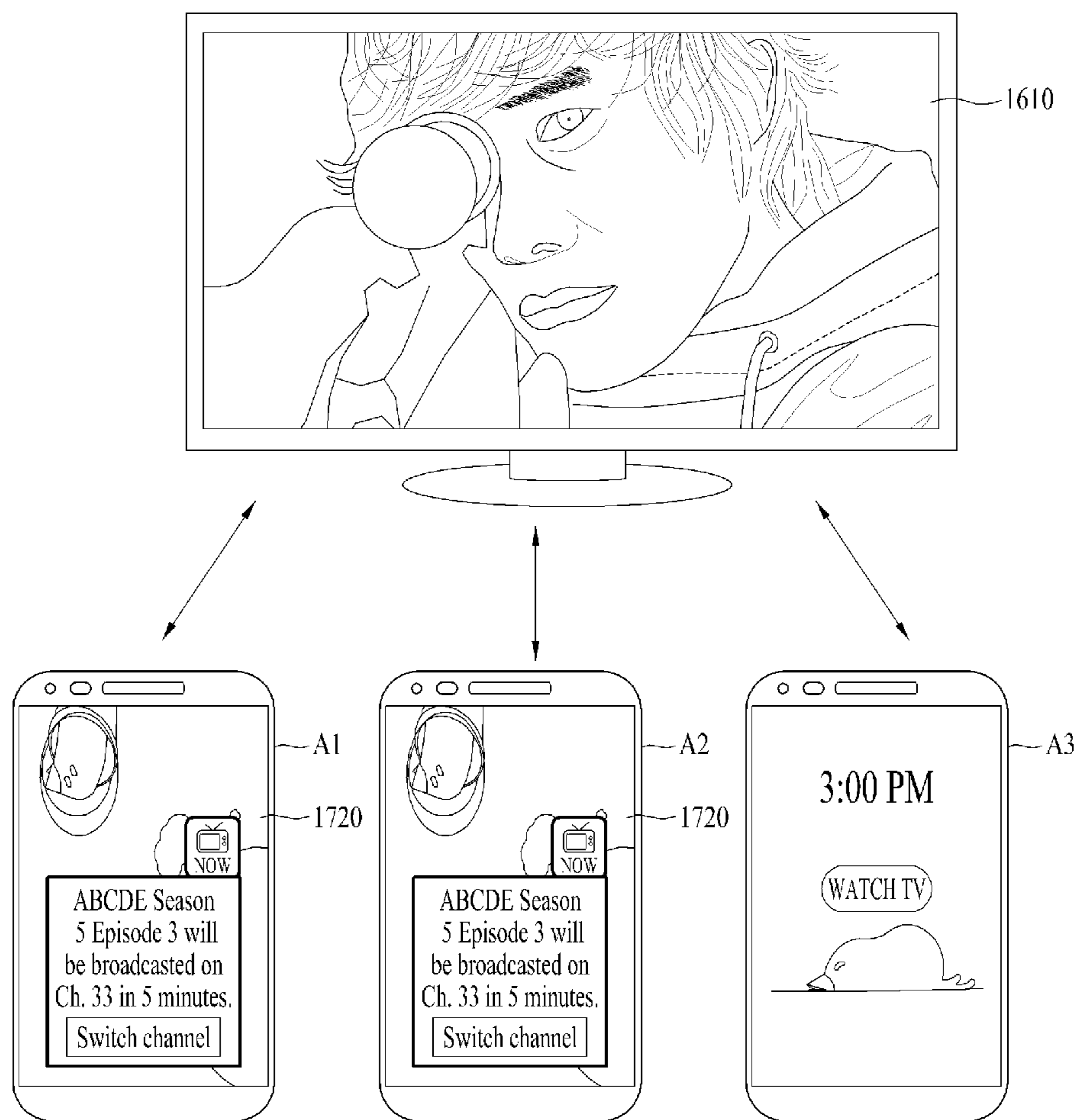


FIG. 23

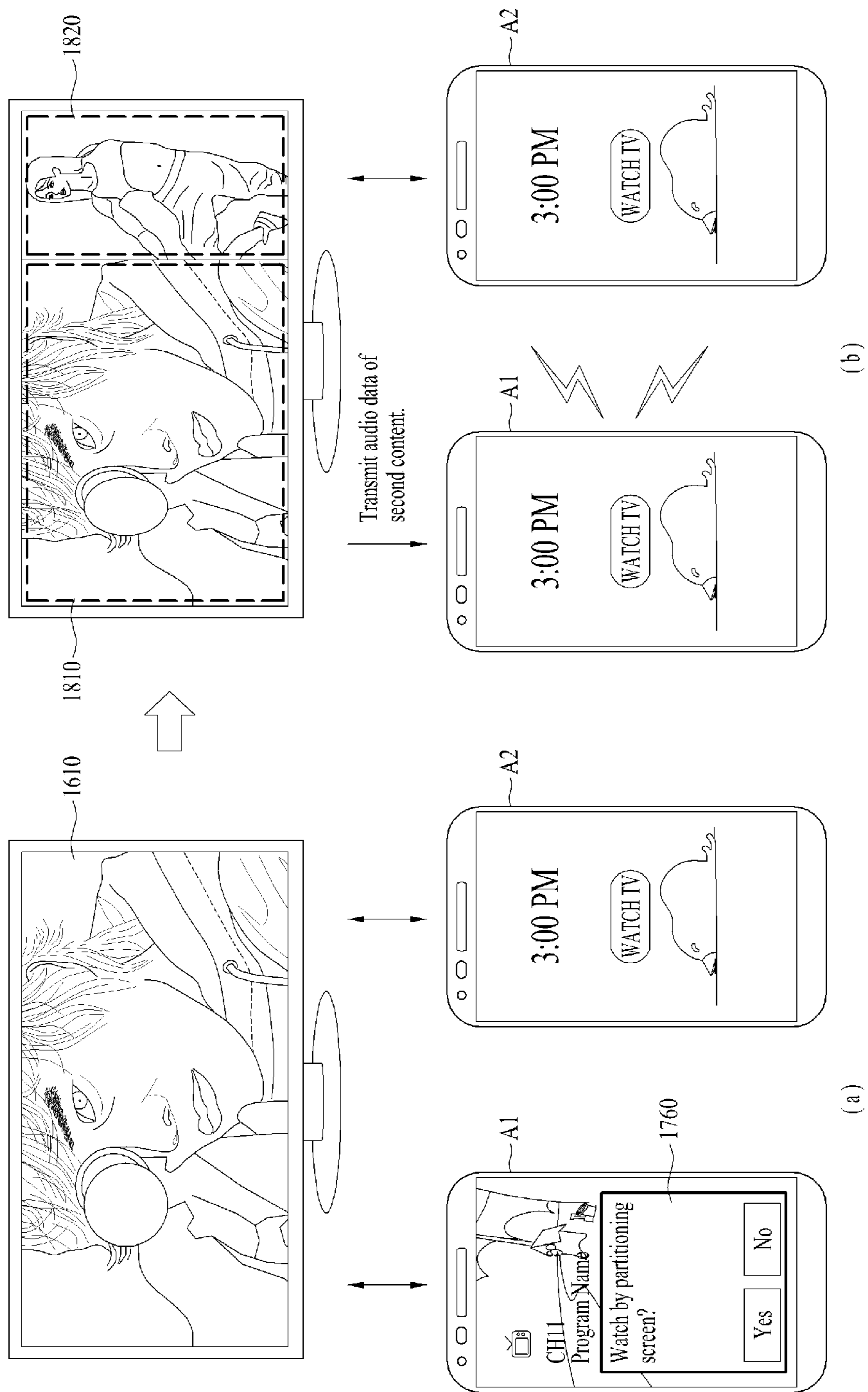
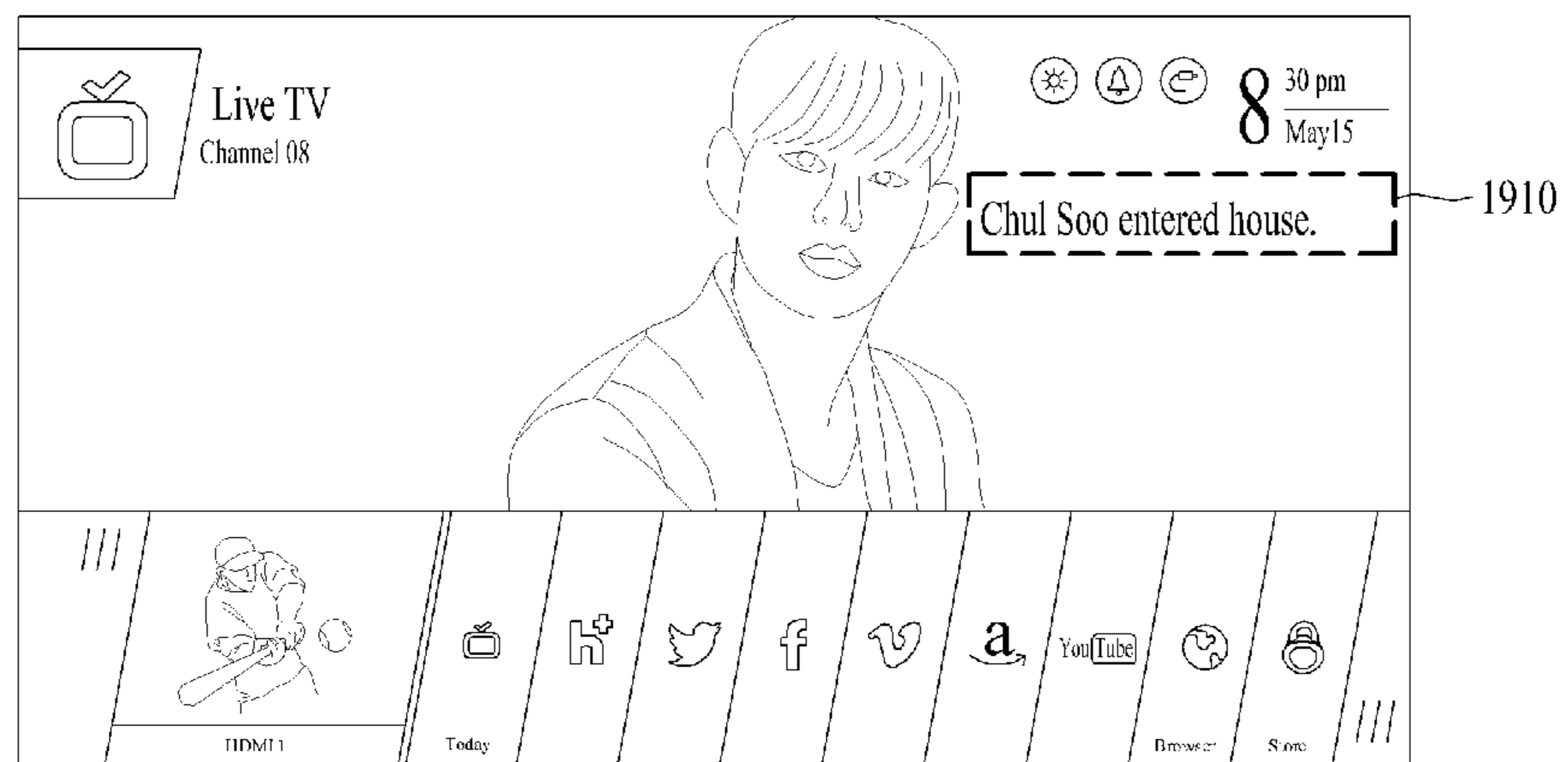


FIG. 24



DISPLAY DEVICE AND CONTROLLING METHOD THEREOF

Pursuant to 35 U.S.C. § 119(a), this application claims the benefit of earlier filing date and right of priority to Korean Application No. 10-2015-0124966, filed on Sep. 3, 2015, the contents of which are hereby incorporated by reference herein in their entirety.

BACKGROUND OF THE INVENTION

Field of the Invention

The present invention relates to a multimedia device and a method for controlling the same.

Discussion of the Related Art

In succession to standing device, such as PC (Personal Computer), TV (Television), and so on, the evolution of mobile devices, such as smart phones, Tablet PCs, and so on, is remarkable. Although standing devices and mobile devices have initially been evolving in each of their respective fields by being differentiated from one another, such fields have become non-distinctive with the recent advent of the digital convergence boom.

Recently, a display device frequently tends to be controlled through a specific application (e.g., a remote controller application) saved in a memory of a mobile terminal (e.g., a smartphone, etc.).

However, according to an existing technology, when a plurality of persons watch a specific content using a single display device, since information notification for another content is displayed on a display unit, it may cause a problem of interrupting a plurality of the persons in watching the specific content. To solve this problem, the demand for a method of providing a user-customized notification in a multi-user environment and controlling a display device through the user-customized notification is increasingly rising.

SUMMARY OF THE INVENTION

Accordingly, embodiments of the present invention are directed to a digital device and controlling method thereof that substantially obviate one or more problems due to limitations and disadvantages of the related art.

One object of the present invention is to provide a digital device and controlling method thereof, by which a user-customized notification can be provided in a multi-user environment.

Another object of the present invention is to provide a digital device and controlling method thereof, by which the display device can be controlled in a manner of providing a user-customized notification without interrupting a user in watching a currently displayed content.

Further object of the present invention is to provide a digital device and controlling method thereof, by which a user-customized notification can be provided to a communication-connected external mobile terminal other than a display device.

Technical tasks obtainable from the present invention are non-limited by the above-mentioned technical tasks. And, other unmentioned technical tasks can be clearly understood from the following description by those having ordinary skill in the technical field to which the present invention pertains.

Additional advantages, objects, and features of the invention will be set forth in the disclosure herein as well as the

accompanying drawings. Such aspects may also be appreciated by those skilled in the art based on the disclosure herein.

To achieve these objects and other advantages and in accordance with the purpose of the invention, as embodied and broadly described herein, a display device according to one embodiment of the present invention may include a display unit configured to display a first content, a communication unit configured to connect communications with a plurality of external mobile terminals, and a controller obtaining personalization information corresponding to each of a plurality of the external mobile terminals, the controller recognizing an occurrence of an event related to the personalization information of a specific one of a plurality of the external mobile terminals, the controller controlling the communication unit to transmit a signal indicating the event occurrence to the specific external mobile terminal, the controller controlling the communication unit to receive a command signal for controlling the display device from the specific external mobile terminal.

In another aspect of the present invention, as embodied and broadly described herein, a method of controlling a display device according to another embodiment of the present invention may include the steps of displaying a first content, performing communications with a plurality of external mobile terminals, obtaining personalization information corresponding to each of a plurality of the external mobile terminals, recognizing an occurrence of an event related to the personalization information of a specific one of a plurality of the external mobile terminals, transmitting a signal indicating the event occurrence to the specific external mobile terminal, and receiving a command signal for controlling the display device from the specific external mobile terminal.

Further scope of applicability of the present invention will become apparent from the detailed description given hereinafter. However, it should be understood that the detailed description and specific examples, while indicating preferred embodiments of the invention, are given by illustration only, since various changes and modifications within the spirit and scope of the invention will become apparent to those skilled in the art from this detailed description.

Accordingly, embodiments of the present invention provide various effects and/or features.

According to at least one of embodiments of the present invention, a user-customized notification can be provided in a multi-user environment.

According to at least one of embodiments of the present invention, a display device can be controlled in a manner of providing a user-customized notification without interrupting a user in watching a currently displayed content.

Effects obtainable from the present invention may be non-limited by the above mentioned effect. And, other unmentioned effects can be clearly understood from the following description by those having ordinary skill in the technical field to which the present invention pertains.

It is to be understood that both the foregoing general description and the following detailed description of the present invention are exemplary and explanatory and are intended to provide further explanation of the invention as claimed.

BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying drawings, which are included to provide a further understanding of the specification and are incorporated in and constitute a part of this application,

illustrate embodiment(s) of the specification and together with the description serve to explain the principle of the specification. In the drawings:

FIG. 1 is a schematic diagram illustrating a service system including a digital device according to one embodiment of the present invention;

FIG. 2 is a block diagram showing a digital device according to one embodiment of the present invention;

FIG. 3 is a block diagram showing the configuration of a digital device according to another embodiment of the present invention;

FIG. 4 is a diagram showing a digital device according to another embodiment of the present invention;

FIG. 5 is a block diagram showing the detailed configuration of each of controllers of FIGS. 2 to 4 according to one embodiment of the present invention;

FIG. 6 is a diagram showing an input unit connected to each of the digital devices of FIGS. 2 to 4 according to one embodiment of the present invention;

FIG. 7 is a diagram illustrating WebOS architecture according to one embodiment of the present invention;

FIG. 8 is a diagram illustrating architecture of a WebOS device according to one embodiment of the present invention;

FIG. 9 is a diagram illustrating a graphic composition flow in a WebOS device according to one embodiment of the present invention;

FIG. 10 is a diagram illustrating a media server according to one embodiment of the present invention;

FIG. 11 is a block diagram showing the configuration of a media server according to one embodiment of the present invention;

FIG. 12 is a diagram illustrating a relationship between a media server and a TV service according to one embodiment of the present invention;

FIG. 13 is a block diagram for configuration modules of a digital device according to one embodiment of the present invention;

FIG. 14 is a flowchart to describe one example of a method of receiving a command signal from a specific external mobile terminal in case of an occurrence of an event related to personalization information of the specific external mobile terminal in a display device;

FIG. 15 is a flowchart to describe one example of a method of transmitting a command signal to a display device in viewpoint of a mobile terminal having a communication connected to a display device according to one embodiment of the present invention;

FIG. 16 is a diagram to describe one example of a method of obtaining personalization information in a display device according to one embodiment of the present invention;

FIG. 17 is a diagram to describe one example of a method of transmitting a signal indicating an event occurrence to a specific external mobile terminal from a display device and receiving a command signal for controlling the display device according to one embodiment of the present invention;

FIG. 18 is a diagram to describe another example of a method of transmitting a signal indicating an event occurrence to a specific external mobile terminal from a display device and receiving a command signal for controlling the display device according to one embodiment of the present invention;

FIG. 19 is a diagram to describe another example of a method of transmitting a signal indicating an event occurrence to a specific external mobile terminal from a display

device and receiving a command signal for controlling the display device according to one embodiment of the present invention;

FIG. 20 is a diagram to describe another example of a method of transmitting a signal indicating an event occurrence to a specific external mobile terminal from a display device and receiving a command signal for controlling the display device according to one embodiment of the present invention;

FIG. 21 is a diagram to describe further example of a method of transmitting a signal indicating an event occurrence to a specific external mobile terminal from a display device and receiving a command signal for controlling the display device according to one embodiment of the present invention;

FIG. 22 is a diagram to describe one example of a method of transmitting a signal indicating an event occurrence to a plurality of external mobile terminals from a display device and receiving a command signal for controlling the display device according to one embodiment of the present invention;

FIG. 23 is a diagram to describe one example of a method of displaying at least two contents by partitioning a screen in a display device according to one embodiment of the present invention; and

FIG. 24 is a diagram to describe one example of a method of displaying information on a communication-connected external mobile terminal in a display device according to one embodiment of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

Description will now be given in detail according to exemplary embodiments disclosed herein, with reference to the accompanying drawings. For the sake of brief description with reference to the drawings, the same or equivalent components may be provided with the same reference numbers, and description thereof will not be repeated. In general, a suffix such as "module" and "unit" may be used to refer to elements or components. Use of such a suffix herein is merely intended to facilitate description of the specification, and the suffix itself is not intended to give any special meaning or function. In the present disclosure, that which is well-known to one of ordinary skill in the relevant art has generally been omitted for the sake of brevity. The accompanying drawings are used to help easily understand various technical features and it should be understood that the embodiments presented herein are not limited by the accompanying drawings. As such, the present disclosure should be construed to extend to any alterations, equivalents and substitutes in addition to those which are particularly set out in the accompanying drawings.

In the following description, various embodiments according to the present invention are explained with reference to attached drawings.

FIG. 1 illustrates a broadcast system including a digital receiver according to an embodiment of the present invention.

Referring to FIG. 1, examples of a broadcast system comprising a digital receiver may include a content provider (CP) 10, a service provider (SP) 20, a network provider (NP) 30, and a home network end user (HNED) (Customer) 40. The HNED 40 includes a client 100, that is, a digital receiver.

Each of the CP 10, SP 20 and NP 30, or a combination thereof may be referred to as a server. The HNED 40 can

also function as a server. The term 'server' means an entity that transmits data to another entity in a digital broadcast environment. Considering a server-client concept, the server can be regarded as an absolute concept and a relative concept. For example, one entity can be a server in a relationship with a first entity and can be a client in a relationship with a second entity.

The CP 10 is an entity that produces content. Referring to FIG. 1, the CP 10 can include a first or second terrestrial broadcaster, a cable system operator (SO), a multiple system operator (MSO), a satellite broadcaster, various Internet broadcasters, private content providers (CPs), etc. The content can include applications as well as broadcast content.

The SP 20 packetizes content provided by the CP 10. Referring to FIG. 1, the SP 20 packetizes content provided by the CP 10 into one or more services available for users.

The SP 20 can provide services to the client 100 in a uni-cast or multi-cast manner.

The CP 10 and the SP 20 can be configured in the form of one entity. For example, the CP 10 can function as the SP 20 by producing content and directly packetizing the produced content into services, and vice versa.

The NP 30 can provide a network environment for data exchange between the server 10 and/or 20 and the client 100. The NP 30 supports wired/wireless communication protocols and constructs environments therefor. In addition, the NP 30 can provide a cloud environment.

The client 100 can construct a home network and transmit/receive data.

The server can use and request a content protection means such as conditional access. In this case, the client 100 can use a means such as a cable card or downloadable CAS (DCAS), which corresponds to the content protection means of the server.

In addition, the client 100 can use an interactive service through a network. In this case, the client 100 can directly serve as the CP 10 and/or the SP 20 in a relationship with another client or indirectly function as a server of the other client.

FIG. 2 is a schematic diagram of a digital receiver 200 according to an embodiment of the present invention. The digital receiver 200 may correspond to the client 100 shown in FIG. 1.

The digital receiver 200 may include a network interface 201, a TCP/IP manager 202, a service delivery manager 203, an SI (System Information, Service Information or Signaling Information) decoder 204, a demultiplexer 205, an audio decoder 206, a video decoder 207, a display A/V and OSD (On Screen Display) module 208, a service control manager 209, a service discovery manager 210, a SI & metadata database (DB) 211, a metadata manager 212, an application manager, etc.

The network interface 201 may receive or transmit IP packets including service data through a network. In other words, the network interface 201 may receive IP packets including at least one of text data, image data, audio data, and video data, used for SNS, as well as services and applications from a server connected thereto through a network.

The TCP/IP manager 202 may involve delivery of IP packets transmitted to the digital receiver 200 and IP packets transmitted from the digital receiver 200, that is, packet delivery between a source and a destination. The TCP/IP manager 202 may classify received packets according to an appropriate protocol and output the classified packets to the

service delivery manager 205, the service discovery manager 210, the service control manager 209, and the metadata manager 212.

The service delivery manager 203 may control classification and processing of service data. The service delivery manager 203 may control real-time streaming data, for example, using real-time protocol/real-time control protocol (RTP/RTCP). In other words, the service delivery manager 203 may parse a real-time streaming data packet, transmitted on the basis of the RTP, according to the RTP and transmits the parsed data packet to the demultiplexer 205 or store the parsed data packet in the SI & metadata DB 211 under the control of the service manager 213. The service delivery manager 203 can feed back network reception information to the server on the basis of the RTP.

The demultiplexer 205 may demultiplex audio data, video data, SI from a received packet through packet identifier (PID) filtering and transmit the demultiplexed data to corresponding processors, that is, the audio/video decoder 206/207 and the SI decoder 204.

The SI decoder 204 may parse and/or decode SI data such as program specific information (PSI), program and system information protocol (PSIP), digital video broadcast-service information (DVB-SI), etc.

The SI decoder 204 may store the parsed and/or decoded SI data in the SI & metadata DB 211. The SI data stored in the SI & metadata DB 211 can be read or extracted and used by a component which requires the SI data. EPG data can also be read from the SI & metadata DB 211. This will be described below in detail.

The audio decoder 206 and the video decoder 207 respectively may decode audio data and video data, which are demultiplexed by the demultiplexer 205. The decoded audio data and video data may be provided to the user through the display unit 208.

The application manager may include a service manager 213 and a user interface (UI) manager 214, administrate the overall state of the digital receiver 200, provides a UI, and manage other managers.

The UI manager 214 can receive a key input from the user and provide a graphical user interface (GUI) related to a receiver operation corresponding to the key input through OSD.

The service manager 213 may control and manage service-related managers such as the service delivery manager 203, the service discovery manager 210, the service control manager 209, and the metadata manager 212.

The service manager 213 may configure a channel map and enable channel control at the request of the user on the basis of the channel map.

The service manager 213 may receive service information corresponding to channel from the SI decoder 204 and set audio/video PID of a selected channel to the demultiplexer 205 so as to control the demultiplexing procedure of the demultiplexer 205.

The application manager can configure an OSD image or control configuration of the OSD image to provide a window for SNS on a predetermined region of the screen when the user requests SNS. The application manager can configure the OSD image or control the configuration of OSD image such that the SNS window can be determined and provided at the request of the user in consideration of other services, for example, a broadcast service. In other words, when the digital receiver 200 may provide a service (for example, SNS) through an image on the screen, the digital receiver

200 may configure the image such that it can appropriately cope with requests in consideration of relationship with other services, priority, etc.

The application manager can receive data for SNS from a related external server such as an SNS providing server or a manufacturer-provided server and store the received data in a memory such that the data is used to configure OSD for providing SNS at the request of the user and SNS may be provided through a predetermined area of the screen. Furthermore, the digital receiver **200** can store data, related with a service and input by the user during the service, in the memory in a similar manner such that the data is used to configure the service and, if required, process the data into a form required for another digital receiver and transmit the processed data to the other digital receiver or a related service server.

In addition, the application manager, the controller or the digital receiver can control information or an action corresponding to a request of the user to be executed when the user makes the request while using the SNS. For example, when the user selects input data of another user or a region corresponding to the input data while using the SNS, the application manager, the controller or the digital receiver may control the first process and/or the second process for handling the selected data or region to be performed and control the first result and/or the second result to be output in an appropriate form. The first result and/or the second result can include information, an action, a related UI, etc. and be configured in various forms such as text, an image, audio/video data, etc. The first result and/or the second result can be manually or automatically provided and performed by the digital receiver.

When the user moves the first result (e.g. image data) to a broadcast program or broadcast service output area through drag & drop, the digital receiver can perform the second process (e.g., search process) on data relating to the first result using an electronic program guide (EPG) or electronic service guide (ESG) (referred to as 'broadcast guide' hereinafter) (i.e., a search engine) to provide a second result. Here, the second result can be provided in a form similar to the broadcast guide used as a search engine or provided as a separately configured UI. When the second result is provided in the form of the broadcast guide, other data can be provided with the second result. In this case, the second result can be configured such that it is distinguished from other data so as to allow the user to easily recognize the second data. To discriminate the second result from other data, the second result can be highlighted, hatched, and provided in 3-dimensional (3D) form.

In the execution of the second process, the digital receiver can automatically determine the type of the second process and whether or not to perform the second process on the basis of a position variation of the first result. In this case, coordinate information of the screen can be used for determining whether the position of the first result is changed or for information on a changed position between the second process and the first result. For example, when a service and/or OSD may be displayed on the screen, the digital receiver can determine and store coordinate information about the displayed service and/or OSD. Accordingly, the digital receiver can be aware of coordinate information about a service and data being provided to the screen in advance and thus can recognize a variation in the position (information) of the first result on the basis of the coordinate information and perform the second process based on the position of the first result.

The service discovery manager **210** may provide information required to select a service provider that provides a service. Upon receipt of a signal for selecting a channel from the service manager **213**, the service discovery manager **210** discovers a service on the basis of the received signal.

The service control manager **209** may select and control a service. For example, the service control manager **209** may perform service selection and control using IGMP (Internet Group Management Protocol) or real time streaming protocol (RTSP) when the user selects a live broadcast service and using RTSP when the user selects a video on demand (VOD) service.

The schemes or protocols described in the specification are exemplified in order to aid in understanding of the present invention for convenience of explanations and the scope of the present invention is not limited thereto. Accordingly, the schemes or protocols can be determined in consideration of conditions different from the exemplified ones and other schemes or protocols can be used.

The metadata manager **212** may manage metadata regarding services and store metadata in the SI & metadata DB **211**.

The SI & metadata DB **211** may store SI data decoded by the SI decoder **204**, metadata managed by the metadata manager **212**, and information required to select a service provider, which is provided by the service discovery manager **210**. In addition, the SI & metadata DB **211** can store system set-up data.

An IMS (IP Multimedia Subsystem) gateway **250** may include functions required to access an IMS based IPTV services.

FIG. 3 is a block diagram of a mobile terminal **300** in accordance with an embodiment of the present invention. With reference to FIG. 3, the mobile terminal **300** includes a wireless communication unit **310**, an A/V (audio/video) input unit **320**, an user input unit **330**, a sensing unit **340**, an output unit **350**, a memory **360**, an interface unit **370**, a controller **380**, and a power supply unit **390**. FIG. 3 shows the mobile terminal **300** having various components, but it is understood that implementing all of the illustrated components is not a requirement. More or fewer components may be implemented according to various embodiments.

The wireless communication unit **310** typically includes one or more components which permit wireless communication between the mobile terminal **300** and a wireless communication system or network within which the mobile terminal **300** is located. For instance, the wireless communication unit **310** can include a broadcast receiving module **311**, a mobile communication module **312**, a wireless Internet module **313**, a short-range communication module **314**, and a position-location module **315**.

The broadcast receiving module **311** receives a broadcast signal and/or broadcast associated information from an external broadcast managing server via a broadcast channel. The broadcast channel may include a satellite channel and a terrestrial channel. At least two broadcast receiving modules **311** can be provided in the mobile terminal **300** to facilitate simultaneous reception of at least two broadcast channels or broadcast channel switching.

The broadcast managing server is generally a server which generates and transmits a broadcast signal and/or broadcast associated information or a server which is provided with a previously generated broadcast signal and/or broadcast associated information and then transmits the provided signal or information to a terminal. The broadcast signal may be implemented as a TV broadcast signal, a radio broadcast signal, and/or a data broadcast signal, among other

signals. If desired, the broadcast signal may further include a broadcast signal combined with a TV or radio broadcast signal.

The broadcast associated information includes information associated with a broadcast channel, a broadcast program, or a broadcast service provider. Furthermore, the broadcast associated information can be provided via a mobile communication network. In this case, the broadcast associated information can be received by the mobile communication module **312**.

The broadcast associated information can be implemented in various forms. For instance, broadcast associated information may include an electronic program guide (EPG) of digital multimedia broadcasting (DMB) and an electronic service guide (ESG) of digital video broadcast-handheld (DVB-H).

The broadcast receiving module **311** may be configured to receive broadcast signals transmitted from various types of broadcast systems. By non-limiting example, such broadcasting systems may include digital multimedia broadcasting-terrestrial (DMB-T), digital multimedia broadcasting-satellite (DMB-S), digital video broadcast-handheld (DVB-H), digital video broadcast-convergence of broadcasting and mobile services (DVB-CBMS), Open Mobile Alliance Broadcast (OMA-BCAST), the data broadcasting system known as media forward link only (MediaFLO™) and integrated services digital broadcast-terrestrial (ISDB-T). Optionally, the broadcast receiving module **311** can be configured to be suitable for other broadcasting systems as well as the above-noted digital broadcasting systems.

The broadcast signal and/or broadcast associated information received by the broadcast receiving module **311** may be stored in a suitable device, such as the memory **360**.

The mobile communication module **312** transmits/receives wireless signals to/from one or more network entities (e.g., a base station, an external terminal, and/or a server) via a mobile network such as GSM (Global System for Mobile communications), CDMA (Code Division Multiple Access), or WCDMA (Wideband CDMA). Such wireless signals may carry audio, video, and data according to text/multimedia messages.

The wireless Internet module **313** supports Internet access for the mobile terminal **300**. This module may be internally or externally coupled to the mobile terminal **300**. The wireless Internet technology can include WLAN (Wireless LAN), Wi-Fi, Wibro™ (Wireless broadband), Wimax™ (World Interoperability for Microwave Access), HSDPA (High Speed Downlink Packet Access), GSM, CDMA, WCDMA, or LTE (Long Term Evolution).

Wireless Internet access by Wibro™, HSDPA, GSM, CDMA, WCDMA, or LTE is achieved via a mobile communication network. In this regard, the wireless Internet module **313** may be considered as being a kind of the mobile communication module **312** to perform the wireless Internet access via the mobile communication network.

The short-range communication module **314** facilitates relatively short-range communications. Suitable technologies for implementing this module include radio frequency identification (RFID), infrared data association (IrDA), ultra-wideband (UWB), as well as the networking technologies commonly referred to as Bluetooth™ and ZigBee™, to name a few.

The position-location module **315** identifies or otherwise obtains the location of the mobile terminal **100**. According to one embodiment, this module may be implemented with a global positioning system (GPS) module. The GPS module **315** is able to precisely calculate current 3-dimensional

position information based on at least longitude, latitude or altitude and direction (or orientation) by calculating distance information and precise time information from at least three satellites and then applying triangulation to the calculated information. Location information and time information are calculated using three satellites, and errors of the calculated location position and one or more time information are then amended (or corrected) using another satellite. In addition, the GPS module **315** is able to calculate speed information by continuously calculating a real-time current location.

With continued reference to FIG. 3, the audio/video (A/V) input unit **320** is configured to provide audio or video signal input to the mobile terminal **300**. As shown, the A/V input unit **320** includes a camera **321** and a microphone **322**. The camera **321** receives and processes image frames of still pictures or video, which are obtained by an image sensor in a video call mode or a photographing mode. Furthermore, the processed image frames can be displayed on the display **351**.

The image frames processed by the camera **321** can be stored in the memory **360** or can be transmitted to an external recipient via the wireless communication unit **310**. Optionally, at least two cameras **321** can be provided in the mobile terminal **300** according to the environment of usage.

The microphone **322** receives an external audio signal while the portable device is in a particular mode, such as phone call mode, recording mode and voice recognition. This audio signal is processed and converted into electronic audio data. The processed audio data is transformed into a format transmittable to a mobile communication base station via the mobile communication module **312** in a call mode. The microphone **322** typically includes assorted noise removing algorithms to remove noise generated in the course of receiving the external audio signal.

The user input unit **330** generates input data responsive to user manipulation of an associated input device or devices. Examples of such devices include a keypad, a dome switch, a touchpad (e.g., static pressure/capacitance), a jog wheel, and a jog switch.

The sensing unit **340** provides sensing signals for controlling operations of the mobile terminal **300** using status measurements of various aspects of the mobile terminal. For instance, the sensing unit **340** may detect an open/closed status of the mobile terminal **100**, the relative positioning of components (e.g., a display and keypad) of the mobile terminal **300**, a change of position (or location) of the mobile terminal **300** or a component of the mobile terminal **300**, a presence or absence of user contact with the mobile terminal **300**, and an orientation or acceleration/deceleration of the mobile terminal **300**. As an example, a mobile terminal **300** configured as a slide-type mobile terminal is considered. In this configuration, the sensing unit **340** may sense whether a sliding portion of the mobile terminal is open or closed. According to other examples, the sensing unit **340** senses the presence or absence of power provided by the power supply unit **390**, and the presence or absence of a coupling or other connection between the interface unit **370** and an external device. According to one embodiment, the sensing unit **340** can include a proximity sensor **341**.

The output unit **350** generates output relevant to the senses of sight, hearing, and touch. Furthermore, the output unit **350** includes the display **351**, an audio output module **352**, an alarm unit **353**, a haptic module **354**, and a projector module **355**.

The display **351** is typically implemented to visually display (output) information associated with the mobile terminal **300**. For instance, if the mobile terminal is oper-

ating in a phone call mode, the display will generally provide a user interface (UI) or graphical user interface (GUI) which includes information associated with placing, conducting, and terminating a phone call. As another example, if the mobile terminal **300** is in a video call mode or a photographing mode, the display **351** may additionally or alternatively display images which are associated with these modes, the UI or the GUI.

The display module **351** may be implemented using known display technologies. These technologies include, for example, a liquid crystal display (LCD), a thin film transistor-liquid crystal display (TFT-LCD), an organic light-emitting diode display (OLED), a flexible display and a three-dimensional display. The mobile terminal **300** may include one or more of such displays.

Some of the displays can be implemented in a transparent or optical transmissive type, i.e., a transparent display. A representative example of the transparent display is the TOLED (transparent OLED). A rear configuration of the display **351** can be implemented as the optical transmissive type as well. In this configuration, a user may be able to see an object located at the rear of a terminal body on a portion of the display **351** of the terminal body.

At least two displays **351** can be provided in the mobile terminal **300** in accordance with one embodiment of the mobile terminal **300**. For instance, a plurality of displays can be arranged to be spaced apart from each other or to form a single body on a single face of the mobile terminal **300**. Alternatively, a plurality of displays can be arranged on different faces of the mobile terminal **300**.

If the display **351** and a sensor for detecting a touch action (hereinafter called 'touch sensor') are configured as a mutual layer structure (hereinafter called 'touch screen'), the display **351** is usable as an input device as well as an output device. In this case, the touch sensor can be configured as a touch film, a touch sheet, or a touchpad.

The touch sensor can be configured to convert pressure applied to a specific portion of the display **351** or a variation of capacitance generated from a specific portion of the display **351** to an electronic input signal. Moreover, the touch sensor is configurable to detect pressure of a touch as well as a touched position or size.

If a touch input is made to the touch sensor, a signal(s) corresponding to the touch input is transferred to a touch controller. The touch controller processes the signal(s) and then transfers the processed signal(s) to the controller **380**. Therefore, the controller **380** is made aware when a prescribed portion of the display **351** is touched.

Referring to FIG. 3, a proximity sensor **341** can be provided at an internal area of the mobile terminal **300** enclosed by the touch screen or around the touch screen. The proximity sensor is a sensor that detects a presence or non-presence of an object approaching a prescribed detecting surface or an object existing (or located) around the proximity sensor using an electromagnetic field strength or infrared ray without mechanical contact. Hence, the proximity sensor **341** is more durable than a contact type sensor and also has utility broader than the contact type sensor.

The proximity sensor **341** can include one of a transmissive photoelectric sensor, a direct reflective photoelectric sensor, a mirror reflective photoelectric sensor, a radio frequency oscillation proximity sensor, an electrostatic capacity proximity sensor, a magnetic proximity sensor, and an infrared proximity sensor. If the touch screen includes the electrostatic capacity proximity sensor, it is configured to detect the proximity of a pointer using a variation of an electric field according to the proximity of the pointer. In this

configuration, the touch screen (touch sensor) can be considered as the proximity sensor.

For clarity and convenience of explanation, an action for enabling the pointer approaching the touch screen to be recognized as placed on the touch screen may be named 'proximity touch' and an action of enabling the pointer to actually come into contact with the touch screen may be named 'contact touch'. And, a position, at which the proximity touch is made to the touch screen using the pointer, may mean a position of the pointer vertically corresponding to the touch screen when the pointer makes the proximity touch.

The proximity sensor detects a proximity touch and a proximity touch pattern (e.g., a proximity touch distance, a proximity touch duration, a proximity touch position, a proximity touch shift state). Information corresponding to the detected proximity touch action and the detected proximity touch pattern can be output to the touch screen.

The audio output module **352** functions in various modes including a call-receiving mode, a call-placing mode, a recording mode, a voice recognition mode, and a broadcast reception mode to output audio data which is received from the wireless communication unit **310** or is stored in the memory **360**. During operation, the audio output module **352** outputs audio relating to a particular function (e.g., call received, message received). The audio output module **352** may be implemented using one or more speakers, buzzers, other audio producing devices, and combinations of these devices.

The alarm unit **353** outputs a signal for announcing the occurrence of a particular event associated with the mobile terminal **300**. Typical events include a call received, a message received and a touch input received. The alarm unit **353** is able to output a signal for announcing the event occurrence by way of vibration as well as video or audio signal. The video or audio signal can be output via the display **351** or the audio output module **352**. Hence, the display **351** or the audio output module **352** can be regarded as a part of the alarm unit **353**.

The haptic module **354** generates various tactile effects that can be sensed by a user. Vibration is a representative one of the tactile effects generated by the haptic module **354**. The strength and pattern of the vibration generated by the haptic module **354** are controllable. For instance, different vibrations can be output in a manner of being synthesized together or can be output in sequence.

The haptic module **354** is able to generate various tactile effects as well as the vibration. For instance, the haptic module **354** may generate an effect attributed to the arrangement of pins vertically moving against a contact skin surface, an effect attributed to the injection/suction power of air through an injection/suction hole, an effect attributed to the skim over a skin surface, an effect attributed to a contact with an electrode, an effect attributed to an electrostatic force, and an effect attributed to the representation of a hot/cold sense using an endothermic or exothermic device.

The haptic module **354** can be implemented to enable a user to sense the tactile effect through a muscle sense of a finger or an arm as well as to transfer the tactile effect through direct contact. Optionally, at least two haptic modules **354** can be provided in the mobile terminal **300** in accordance with an embodiment of the mobile terminal **300**.

The memory **360** is generally used to store various types of data to support the processing, control, and storage requirements of the mobile terminal **300**. Examples of such data include program instructions for applications operating on the mobile terminal **300**, contact data, phonebook data,

messages, audio, still pictures (or photo), and moving pictures. Furthermore, a recent use history or a cumulative use frequency of each data (e.g., use frequency for each phone-book, each message or each multimedia file) can be stored in the memory **360**.

Moreover, data for various patterns of vibration and/or sound output in response to a touch input to the touch screen can be stored in the memory **360**.

The memory **360** may be implemented using any type or combination of suitable volatile and non-volatile memory or storage devices including hard disk, random access memory (RAM), static random access memory (SRAM), electrically erasable programmable read-only memory (EEPROM), erasable programmable read-only memory (EPROM), programmable read-only memory (PROM), read-only memory (ROM), magnetic memory, flash memory, magnetic or optical disk, multimedia card micro type memory, card-type memory (e.g., SD memory or XD memory), or other similar memory or data storage device. Furthermore, the mobile terminal **300** is able to operate in association with a web storage for performing a storage function of the memory **360** on the Internet.

The interface unit **370** may be implemented to couple the mobile terminal **100** with external devices. The interface unit **370** receives data from the external devices or is supplied with power and then transfers the data or power to the respective elements of the mobile terminal **300** or enables data within the mobile terminal **300** to be transferred to the external devices. The interface unit **370** may be configured using a wired/wireless headset port, an external charger port, a wired/wireless data port, a memory card port, a port for coupling to a device having an identity module, audio input/output ports, video input/output ports, and/or an earphone port.

The identity module is a chip for storing various kinds of information for authenticating a usage authority of the mobile terminal **300** and can include a User Identify Module (UIM), a Subscriber Identity Module (SIM), and/or a Universal Subscriber Identity Module (USIM). A device having the identity module (hereinafter called 'identity device') can be manufactured as a smart card. Therefore, the identity device is connectible to the mobile terminal **300** via the corresponding port.

When the mobile terminal **300** is connected to an external cradle, the interface unit **370** becomes a passage for supplying the mobile terminal **300** with a power from the cradle or a passage for delivering various command signals input from the cradle by a user to the mobile terminal **300**. Each of the various command signals input from the cradle or the power can operate as a signal enabling the mobile terminal **300** to recognize that it is correctly loaded in the cradle.

The controller **380** typically controls the overall operations of the mobile terminal **300**. For example, the controller **380** performs the control and processing associated with voice calls, data communications, and video calls. The controller **380** may include a multimedia module **381** that provides multimedia playback. The multimedia module **381** may be configured as part of the controller **380**, or implemented as a separate component.

Moreover, the controller **380** is able to perform a pattern (or image) recognizing process for recognizing a writing input and a picture drawing input carried out on the touch screen as characters or images, respectively.

The power supply unit **390** provides power required by various components of the mobile terminal **300**. The power may be internal power, external power, or combinations of internal and external power.

Various embodiments described herein may be implemented in a computer-readable medium using, for example, computer software, hardware, or some combination of computer software and hardware. For a hardware implementation, the embodiments described herein may be implemented within one or more application specific integrated circuits (ASICs), digital signal processors (DSPs), digital signal processing devices (DSPDs), programmable logic devices (PLDs), field programmable gate arrays (FPGAs), processors, controllers, micro-controllers, microprocessors, other electronic units designed to perform the functions described herein, or a selective combination thereof. Such embodiments may also be implemented by the controller **180**.

For a software implementation, the embodiments described herein may be implemented with separate software modules, such as procedures and functions, each of which performs one or more of the functions and operations described herein. The software codes can be implemented with a software application written in any suitable programming language and may be stored in memory such as the memory **360**, and executed by a controller or processor, such as the controller **380**.

FIG. 4 illustrates a digital receiver according to another embodiment of the present invention.

Referring to FIG. 4, an exemplary digital receiver **400** according to the present invention may include a broadcast receiving unit **405**, an external device interface **435**, a storage unit **440**, a user input interface **450**, a controller **470**, a display unit **480**, an audio output unit **485**, a power supply unit **490**, and a photographing unit (not shown). The broadcast receiving unit **405** may include at least one of one or more tuner **410**, a demodulator **420**, and a network interface **430**. The broadcast receiving unit **405** may include the tuner **410** and the demodulator **420** without the network interface **430**, or may include the network interface **430** without the tuner **410** and the demodulator **420**. The broadcast receiving unit **405** may include a multiplexer (not shown) to multiplex a signal, which is subjected to the tuner **410** and demodulated by the demodulator **420**, and a signal received through the network interface **40**. In addition, the broadcast receiving unit **405** can include a demultiplexer (not shown) and demultiplex a multiplexed signal, a demodulated signal, or a signal received through the network interface **430**.

The tuner **410** may receive a radio frequency (RF) broadcast signal by tuning to a channel selected by the user from among RF broadcast signals received through an antenna or all previously stored channels.

The demodulator **420** may receive a digital IF (Intermediate Frequency) signal (DIF) converted by the tuner **410** and demodulate the DIF signal.

A stream signal output from the demodulator **420** may be input to the controller **470**. The controller **470** can control demultiplexing, audio/video signal processing, etc. Furthermore, the controller **470** can control output of an image through the display unit **480** and output of audio through the audio output unit **485**.

The external device interface **435** may provide an environment for interfacing external devices with the digital receiver **400**. To implement this, the external device interface **435** may include an A/V input/output unit (not shown) or an RF communication unit (not shown).

The external device interface **435** can be connected with external devices such as a digital versatile disk (DVD), a Blu-ray player, a game device, a camera, a camcorder, a

computer (notebook computer), a Cloud and a mobile device (e.g., a Smart Phone, a tablet PC, and the like) in a wired/wireless manner.

The A/V input/output unit may include a USB (Universal Serial Bus) terminal, a composite video banking sync (CVBS) terminal, a component terminal, an S-video terminal (analog), a digital visual interface (DVI) terminal, a high definition multimedia interface (HDMI) terminal, an RGB terminal, a D-SUB terminal, etc.

The RF communication unit can perform near field communication. The digital receiver **400** can be networked with other electronic apparatuses according to communication protocols such as Bluetooth, radio frequency identification (RFID), infrared data association (IrDA), ultra wideband (UWB), ZigBee, and digital living network alliance (DLNA), for example.

The network interface **430** may provide an interface for connecting the digital receiver **400** to wired/wireless networks.

Using the network interface **430**, the digital receiver can transmit/receive data to/from other users or other electronic apparatuses or access a predetermined web page through a network connected thereto or another network linked to the connected network.

The network interface **430** can selectively receive a desired application from among publicly open applications through a network.

The storage unit **440** may store programs for signal processing and control and store a processed video, audio or data signal.

In addition, the storage unit **440** may execute a function of temporarily storing a video, audio or data signal input from the external device interface **435** or the network interface **430**. The storage unit **440** may store information about a predetermined broadcast channel through a channel memory function.

The storage unit **440** can store an application or a list of applications input from the external device interface **435** or the network interface **430**. The storage unit **440** may store various platforms which will be described later. The storage unit **440** can include storage media of one or more types, such as a flash memory type, a hard disk type, a multimedia card micro type, a card type memory (e.g. SD or XD memory), RAM, EEPROM, etc. The digital receiver **400** may reproduce content files (a video file, a still image file, a music file, a text file, an application file, etc.) and provide them to the user.

While FIG. **4** illustrates an embodiment in which the storage unit **440** is separated from the controller **470**, the configuration of the digital receiver **400** is not limited thereto and the storage unit **440** may be included in the controller **470**.

The user input interface **450** may transmit a signal input by the user to the controller **470** or deliver a signal output from the controller **470** to the user.

For example, the user input interface **450** can receive control signals such as a power on/off signal, a channel selection signal, an image setting signal, etc. from the remote controller **500** or transmit control signals of the controller **470** to the remote controller **500** according to various communication schemes such as RF communication, IR communication, and the like.

The user input interface **450** can transmit control signals input through a power key, a channel key, a volume key, and a local key (not shown) of a set value to the controller **470**.

The user input interface **450** can transmit a control signal input from a sensing unit (not shown) which senses a gesture

of the user or deliver a signal of the controller **470** to the sensing unit (not shown). Here, the sensing unit (not shown) may include a touch sensor, a voice sensor, a position sensor, an action sensor, an acceleration sensor, a gyro sensor, a speed sensor, a tilt sensor, a temperature sensor, a pressure or back-pressure sensor, etc.

The controller **470** can generate and output a signal for video or audio output by demultiplexing streams input through the tuner **410**, the demodulator **420** or the external device interface **435** or processing demultiplexed signals.

A video signal processed by the controller **470** can be input to the display unit **380** and displayed as an image through the display unit **480**. In addition, the video signal processed by the controller **470** can be input to an external output device through the external device interface **435**.

An audio signal processed by the controller **470** can be applied to the audio output unit **485**. Otherwise, the audio signal processed by the controller **470** can be applied to an external output device through the external device interface **435**.

The controller **470** may include a demultiplexer and an image processor, which are not shown in FIG. **4**.

The controller **470** can control the overall operation of the digital receiver **300**. For example, the controller **470** can control the tuner **410** to tune to an RF broadcast corresponding to a channel selected by the user or a previously stored channel.

The controller **470** can control the digital receiver **400** according to a user command input through the user input interface **450** or an internal program. Particularly, the controller **470** can control the digital receiver **400** to be linked to a network to download an application or application list that the user desires to the digital receiver **400**.

For example, the controller **470** may control the tuner **410** to receive a signal of a channel selected in response to a predetermined channel selection command received through the user input interface **450**. In addition, the controller **470** may process a video, audio or data signal corresponding to the selected channel. The controller **470** may control information on a channel selected by the user to be output with a processed video or audio signal through the display unit **480** or the audio output unit **485**.

Alternatively, the controller **470** may control a video signal or an audio signal received from an external apparatus, for example, a camera or a camcorder through the external device interface **435** to be output through the display unit **480** or the audio output unit **485** according to an external device image reproduction command received through the user input interface **450**.

The controller **470** can control the display unit **480** to display images. For example, the controller **470** can control a broadcast image input through the tuner **410**, an external input image received through the external device interface **435**, an image input through the network interface **430**, or an image stored in the storage unit **440** to be displayed on the display unit **480**. Here, an image displayed on the display unit **480** can be a still image or video, and it can be a 2D or 3D image.

The controller **470** can control reproduction of content. Here, the content may be content stored in the digital receiver **400**, received broadcast content, or content input from an external device. The content may include at least one of a broadcast image, an external input image, an audio file, a still image, an image of a linked web, and a text file.

The controller **470** can control display of applications or an application list, downloadable from the digital receiver **400** or an external network, when an application view menu is selected.

The controller **470** can control installation and execution of applications downloaded from an external network in addition to various user interfaces. Furthermore, the controller **470** can control an image relating to an application executed by user selection to be displayed on the display unit **480**.

The digital receiver **400** may further include a channel browsing processor (not shown) which generates a thumbnail image corresponding to a channel signal or an external input signal.

The channel browsing processor can receive a stream signal (e.g., TS) output from the demodulator **420** or a stream signal output from the external device interface **435** and extract an image from the received stream signal to generate a thumbnail image. The generated thumbnail image can be directly input to the controller **470** or can be encoded and then input to the controller **470**. Also, the thumbnail image can be coded into a stream and then applied to the controller **470**. The controller **470** can display a thumbnail list including a plurality of thumbnail images on the display unit **480** using thumbnail images input thereto. The thumbnail images included in the thumbnail list can be updated sequentially or simultaneously. Accordingly, the user can conveniently check content of a plurality of broadcast channels.

The display unit **480** may convert a video signal, a data signal, and an OSD signal processed by the controller **470** and a video signal and a data signal received from the external device interface **435** into RGB signals to generate driving signals. The display unit **480** may be a PDP, an LCD, an OLED, a flexible display, a 3D display or the like. The display unit **480** may be configured as a touch-screen and used as an input device rather than an output device. The audio output unit **485** receives a signal audio-processed by the controller **470**, for example, a stereo signal, a 3.1 channel signal or a 5.1 channel signal, and outputs the received signal as audio. The audio output unit **485** can be configured as one of various speakers.

The digital receiver **400** may further include the sensing unit (not shown) for sensing a gesture of the user, which includes at least one of a touch sensor, a voice sensor, a position sensor, and an action sensor, as described above. A signal sensed by the sensing unit (not shown) can be delivered to the controller **470** through the user input interface **450**. The digital receiver **400** may further include the photographing unit (not shown) for photographing the user. Image information acquired by the photographing unit (not shown) can be supplied to the controller **470**. The controller **470** may sense a gesture of the user from an image captured by the photographing unit (not shown) or a signal sensed by the sensing unit (not shown), or by combining the image and the signal.

The power supply unit **490** may supply power to the digital receiver **400**. Particularly, the power supply unit **490** can supply power to the controller **470** which can be implemented as a system-on-chip (SoC), the display unit **480** for displaying images, and the audio output unit **485** for audio output.

The remote controller **500** may transmit user input to the user input interface **450**. To achieve this, the remote controller **500** can use Bluetooth, RF communication, IR communication, UWB, ZigBee, etc. In addition, the remote controller **500** can receive audio, video or data signal output

from the user input interface **350** and display the received signal or output the same as audio or vibration.

The functions of the application manager shown in FIG. **2** can be divided and executed by the controller **470**, the storage unit **440**, the user interface **450**, the display unit **480** and the audio output unit **485** which are controlled by the controller **470**.

The digital receivers shown in FIGS. **2** and **4** are exemplary and components thereof can be integrated, added or omitted according to specifications thereof. That is, two or more components can be integrated into one component or one component can be subdivided into two or more components as required. The function executed by each component is exemplified to describe embodiments of the present invention and detailed operations or devices do not limit the scope of the present invention. Some of the components shown in FIG. **2** may be omitted or a component (not shown in FIG. **2**) may be added as required. The digital receiver according to the present invention may not include the tuner and the demodulator, differently from the digital receivers shown in FIGS. **2** and **4**, and may receive content through the network interface or the external device interface and reproduce the content.

The digital receiver is an example of image signal processors which process an image stored therein or an input image. Other examples of the image signal processors may include a set-top box (STB) which does not include the display unit **380** and the audio output unit **485** shown in FIG. **4**, a DVD player, a Blu-ray player, a game device, a computer, etc.

FIG. **5** illustrates a digital receiver according to another embodiment of the present invention. Particularly, FIG. **5** shows a configuration for implementing a 3D digital receiver, which can be included in the configurations of FIGS. **2** and **3**.

The digital receiver according to the present invention may include a demultiplexer **510**, an image processor **520**, an OSD generator **540**, a mixer **550**, a frame rate converter (FRC) **555**, and a 3D formatter (or an Output formatter) **560**.

The demultiplexer **510** can demultiplex an input stream signal into an MPEG-2 TS image, an audio signal and a data signal, for example.

The image processor can process a demultiplexed image signal using a video decoder **525** and a scaler **535**. The video decoder **525** can decode the demultiplexed image signal and the scaler **535** can scale the resolution of the decoded image signal such that the image signal can be displayed.

The image signal decoded by the image processor **520** may be input to the mixer **550**.

The OSD generator **540** may generate OSD data automatically or according to user input. For example, the OSD generator **540** may generate data to be displayed on the screen of an output unit in the form of an image or text on the basis of a control signal of a user input interface. OSD data generated by the OSD generator **540** may include various data such as a user interface image of the digital receiver, various menu screens, widget, icons, and information on ratings. The OSD generator **540** can generate a caption of a broadcast image or data for displaying EPG based broadcast information.

The mixer **550** may mix the OSD data generated by the OSD generator **540** and the image signal processed by the image processor **520**. The mixer **550** may provide the mixed signal to the 3D formatter **560**. By mixing the decoded image signal and the OSD data, OSD may be overlaid on a broadcast image or external input image.

The frame rate converter (FRC) **555** may convert a frame rate of input video. For example, the frame rate converter **555** can convert the frame rate of an input 60 Hz video to a frame rate of 120 Hz or 240 Hz, according to an output frequency of the output unit. The frame rate converter **555** may be bypassed when frame conversion is not executed.

The 3D formatter **560** may change the output of the frame rate converter **555**, which is input thereto, into a form suitable for the output format of the output unit. For example, the 3D formatter **560** can output an RGB data signal. In this case, this RGB data signal can be output according to low voltage differential signaling (LVDS) or mini-LVDS. When a 3D image signal output from the frame rate converter **555** is input to the 3D formatter **560**, the 3D formatter **560** can format the 3D image signal such that the 3D image signal is matched to the output format of the output unit, to thereby support a 3D service.

An audio processor (not shown) may audio-process a demultiplexed audio signal. The audio processor (not shown) can support various audio formats. For example, when audio signals are encoded in MPEG-2, MPEG-4, advanced audio coding (AAC), high efficiency-AAC (HE-AAC), AC-3 and bit sliced audio coding (B SAC) formats, the audio processor (not shown) can include decoders corresponding to the formats to process the audio signals. Furthermore, the audio processor (not shown) can control base, treble and volume.

In addition, a data processor (not shown) can process a demultiplexed data signal. For example, when a demultiplexed data signal is encoded, the data processor (not shown) can decode the encoded demultiplexed data signal. Here, the encoded data signal may be EPG information including broadcast information such as the start time and end time (or duration) of a broadcast program which is broadcast through each channel.

FIG. 6 illustrates remote controllers of a digital receiver according to an embodiment of the present invention.

To execute various operations for implementing the present invention according to embodiments, various user interface devices (UIDs) which can communicate with a digital receiver **600** in a wired/wireless manner can be used as remote controllers.

The remote controllers can use various communication protocols such as Bluetooth, RFID, IrDA, UWB, ZigBee, DLNA, etc.

UIDs can include a mobile device (e.g., a smart phone, a tablet PC, and the like), a magic remote controller **620** and a remote controller **630** equipped with a keyboard and a touch pad in addition to a general remote controller **610**.

The magic remote controller **620** may include a gyro sensor mounted therein to sense vibration of a user's hand or rotation. That is, the magic remote controller **620** can move a pointer according to up, down, left and right motions of the user such that the user can easily execute a desired action, for example, easily control a channel or a menu.

The remote controller **630** including the keyboard and touch pad can facilitate text input through the keyboard and control of movement of a pointer and magnification and reduction of a picture or video through the touch pad.

The digital device described in the present specification can be operated by based on WebOS platform. Hereinafter, a WebOS based process or algorithm may be performed by the controller of the above-described digital device. The controller includes the controllers of FIGS. 2 to 5 and has wide concepts. Accordingly, hereinafter, a component for processing WebOS based services, applications, content,

etc., including software, firmware or hardware in a digital device is referred to a controller.

Such a WebOS based platform may improve development independency and functional extensibility by integrating services, applications, etc. based on a Luna-service bus, for example, and increase application development productivity based on web application framework. In addition, system resources, etc. may be efficiently used via a WebOS process and resource management to support multitasking.

A WebOS platform described in the present specification may be available or loaded not only for stationary devices such as personal computers (PCs), TVs and set top boxes (STBs) but also for mobile devices such as cellular phones, smartphones tablet PCs, laptops, and wearable devices.

A software structure for a digital device is a monolithic structure which solves conventional problems depending on markets, is a single process and closed product based on multi-threading, and has difficulties in terms of external applications. In pursuit of new platform based development, cost innovation via chipset replacement and UI application and external application development efficiency, layering and componentization are performed to obtain a 3-layered structure and an add-on structure for an add-on, a single source product and an open application. Recently, modular design of a software structure has been conducted in order to provide a web open application programming interface (API) for an echo system and modular architecture of a functional unit or a native open API for a game engine, and thus a multi-process structure based on a service structure has been produced.

FIG. 7 is a diagram illustrating WebOS architecture according to one embodiment of the present invention.

The architecture of a WebOS platform will now be described with reference to FIG. 7.

The platform may be largely divided into a kernel, a webOS core platform based on a system library, an application, a service, etc.

The architecture of the WebOS platform has a layered structure. OS is provided at a lowest layer, system library(s) are provided at a next highest layer and applications are provided at the highest layer.

First, the lowest layer is an OS layer including a Linux kernel such that Linux is included as an OS of the digital device.

At layers higher than the OS layer, a board support package (BSP)/hardware abstraction layer (HAL) layer, a WebOS core modules layer, a service layer, a Luna-service bus layer and an Enyo framework/native developer's kit (NDK)/QT layer are sequentially provided. At the highest layer, an application layer is provided.

One or more layers of the above-described WebOS layered structure may be omitted and a plurality of layers may be combined to one layer and one layer may be divided into a plurality of layers.

The WebOS core module layer may include a Luna surface manager (LSM) for managing a surface window, etc., a system & application manager (SAM) for managing execution and performance status of applications, etc., and a web application manager (WAM) for managing web applications based on WebKit.

The LSM manages an application window displayed on a screen. The LSM may control display hardware (HW) and provide a buffer for rendering content necessary for applications, and compose and output results of rendering a plurality of applications on a screen.

The SAM manages policy according to several conditions of systems and applications.

The WAM is based on Enyo framework, because a WebOS regards a web application as a basic application.

An application may use a service via a Luna-service bus. A service may be newly registered via a bus and the application may detect and use a desired service.

The service layer may include services having various service levels, such as a TV service, a WebOS service, etc. The WebOS service may include a media server, Node.JS, etc. and, in particular, the Node.JS service supports JavaScript, for example.

The WebOS service may be communicated to a Linux process implementing function logic via a bus. This WebOS service is largely divided into four parts, migrates from a TV process and an existing TV to a WebOS, is developed as services which differ between manufacturers, WebOS common services and Javascripts, and is composed of the Node.JS service used via Node.JS.

The application layer may include all applications supportable by a digital device, such as a TV application, a showcase application, a native application, a web application, etc.

Applications on the WebOS may be divided into a web application, a palm development kit (PDK) application, a Qt Meta Language or Qt Modeling Language (QML) application, etc. according to implementation methods.

The web application is based on a WebKit engine and is performed on WAM runtime. Such a web application is based on Enyo framework or may be developed and performed based on general HTML5, cascading style sheets (CSS) and JavaScripts.

The PDK application includes a native application developed with C/C++ based on a PDK provided for a third party or an external developer. The PDK refers to a set of development libraries and tools provided to enable a third party to develop a native application (C/C++) such as games. For example, the PDK application may be used to develop applications requiring high performance.

The QML application is a native application based on Qt and includes basic applications provided along with the WebOS platform, such as card view, home dashboard, virtual keyboard, etc. QML is a markup language of a script format, not C++.

The native application is an application which is developed and compiled using C/C++ and is executed in the binary form and has an advantage such as high execution speed.

FIG. 8 is a diagram illustrating the architecture of a WebOS device according to one embodiment of the present invention.

FIG. 8 is a block diagram based on a runtime of a WebOS device and is described with reference to the layered structure of FIG. 7.

Hereinafter, a description will be given with reference to FIGS. 7 and 8.

Referring to FIG. 8, services, applications and WebOS core modules are included on a system OS (Linux) and system libraries and communication therebetween may be performed via a Luna-service bus.

Node.JS services based on HTML5 such as e-mail, contact or calendar, CSS, Javascript, etc., WebOS services such as logging, backup, file notify, database (DB), activity manager, system policy, audio daemon (AudioD), update, media server, etc., TV services such as electronic program guide (EPG), personal video recorder (PVR), data broadcasting, etc., CP services such as voice recognition, Now on, notification, search, auto content recognition (ACR), contents list browser (CBOX), wfdd, digital media remastering

(DMR), remote application, download, Sony Philips digital interface format (SDPIF), etc., native applications such as PDK applications, browsers, QML applications, a UI-related TV applications based on Enyo framework and web applications are processed via WebOS core modules such as the above-described SAM, WAM and LSM via the Luna-service bus. The TV applications and the web applications are not necessarily based on Enyo framework or related to UI.

The CBOX may manage metadata and lists of content of external devices such as USB drivers, DLNA devices or Cloud servers connected to a TV. The CBOX may output content listing of various content containers such as USB, data management system (DMS), DVR, Cloud server, etc. as an integrated view. The CBOX may display various types of content listings such as pictures, music or video and manage metadata thereof. The CBOX may output content of an attached storage in real time. For example, if a storage device such as a USB is plugged in, the CBOX should immediately output a content list of the storage device. At this time, a standardized method for processing the content listing may be defined. The CBOX may accommodate various connection protocols.

The SAM is used to improve module complexity and extensibility. For example, an existing system manager processes several functions such as system UI, window management, web application runtime and UX constraint processing via one process and thus has high implementation complexity. In order to solve such a problem, the SAM divides main functions and clarifies an interface between functions, thereby decreasing implementation complexity.

The LSM is supported to independently develop and integrate a system UX such as card view, launcher, etc. and to easily cope with change in product requirements. The LSM maximally uses hardware resources to enable multi-tasking if a plurality of application screens is composed using an app-on-app method and may provide a window management mechanism for 21:9 and a multi-window.

The LSM supports implementation of a system UI based on a QML and improves development productivity. QML UX may easily configure a view using a screen layout and UI components based on model view controller (MVC) and easily develop code for processing user input. An interface between the QML and the WebOS component is achieved via a QML extensibility plug-in and graphic operation of an application may be based on Wayland protocol, luna-service call, etc.

The LSM is an abbreviation for a Luna surface manager and functions as an application window compositor.

The LSM composes and outputs independently developed applications, UI components, etc. on a screen. When components such as recent applications, showcase applications or launcher applications render respective content, the LSM defines an output area, a linkage method, etc. as a compositor. The LSM functioning as a compositor performs processing such as graphic composition, focus management, input events, etc. At this time, the LSM receives event, focus, etc. from an input manager, and a remote controller, a HID such as a mouse and keyboard, a joystick, a game pad, a remote application, a pen touch, etc. may be included as an input manager.

The LSM supports multiple window models and may be simultaneously executed in all applications as a system UI. The LSM may support launcher, recents, setting, notification, system keyboard, volume UI, search, finger gesture, voice recognition (speech to text (STT)), text to speech

(TTS), natural language processing (NLP), etc.), pattern gesture (camera or mobile radio control unit (MRCU)), live menu, ACR, etc.

FIG. 9 is a diagram illustrating a graphic composition flow in a WebOS device according to one embodiment of the present invention.

Referring to FIG. 9, graphic composition processing may be performed via a web application manager 910 functioning as a UI process, a WebKit 920 functioning as a web process, an LSM 930 and a graphics manager (GM) 940.

When the web application manager 910 generates web application based graphics data (or application) as a UI process, the generated graphics data is delivered to the LSM 930 if the graphics data is not a fullscreen application. The web application manager 910 receives an application generated by the WebKit 920 in order to share a graphic processing unit (GPU) memory for graphic management between the UI process and the web process and delivers the application to the LSM 930 if the application is not a fullscreen application. If the application is a fullscreen application, the LSM 930 may bypass the application. In this case, the application is directly delivered to the graphics manager 940.

The LSM 930 transmits the received UI application to a Wayland compositor via a Wayland surface and the Wayland compositor appropriately processes the UI application and delivers the processed UI application to the graphics manager. The graphics data received from the LSM 930 is delivered to the graphics manager compositor via the LSM GM surface of the graphics manager 940, for example.

The fullscreen application is directly delivered to the graphics manager 940 without passing through the LSM 930 as described above and is processed in the graphics manager compositor via the WAM GM surface.

The graphics manager processes and outputs all graphics data in the webOS device and receives and outputs data passing through the above-described LSM GM surface, data passing through a WAM GM surface, and graphics data passing through a GM surface, such as a data broadcasting application or a caption application, on a screen. The function of the GM compositor is equal or similar to the above-described compositor.

FIG. 10 is a diagram illustrating a media server according to one embodiment of the present invention, FIG. 11 is a block diagram of a media server according to one embodiment of the present invention, and FIG. 12 is a diagram illustrating a relationship between a media server and a TV service according to one embodiment of the present invention.

The media server supports execution of a variety of multimedia in a digital device and manages necessary resources. The media server may efficiently use hardware resources necessary for media play. For example, the media server requires audio/video hardware resources for multimedia execution and efficiently manages a resource use status to efficiently use resources. In general, a stationary device having a screen larger than that of a mobile device requires more hardware resources upon multimedia execution and requires high encoding/decoding rate and graphics data transfer rate due to a large amount of data. The media server should perform not only streaming or file playback but also broadcasting, recording and tuning tasks, a task for simultaneously viewing and recording, and a task for simultaneous displaying a sender and a recipient on a screen upon video call. It is difficult for the media server to simultaneously perform several tasks due to restriction in hardware resources such as an encoder, a decoder, a tuner, a display

engine, etc. in chipset units. For example, the media server restricts a use scenario or performs processing using user input.

The media server may make system stability robust, and may remove a playback pipeline, in which errors occur during media playback, per pipeline, such that other media play is not influenced even when errors occur. Such a pipeline is a chain for connecting unit functions such as decoding, analysis, output, etc. upon a media playback request, and required unit functions may be changed according to media type, etc.

The media server may have extensibility and may add a new type of pipeline without influencing an existing implementation method. For example, the media server may accommodate a camera pipeline, a video conference (Skype) pipeline, a third-party pipeline, etc.

The media server may process general media playback and TV task execution as separate services because the interface of the TV service is different from that of media playback. The media server supports operation such as “setchannel”, “channelup”, “channeldown”, “channeltuning” and “recordstart” in relation to the TV service and support operation such as “play”, “pause” and “stop” in relation to general media playback, that is, supports different operations with respect to the TV service and general media playback and processes the TV service and media playback as separate services.

The media server may control or manage a resource management function. Hardware resource assignment or recovery in a device is conducted by the media server. In particular, the TV service process delivers a task which is being executed and a resource assignment status to the media server. The media server secures resources to execute a pipeline whenever media is executed, allows media execution due to priority (e.g., policy) upon media execution request, and performs resource recovery of another pipeline, based on a resource status of each pipeline. The predefined execution priority and resource information necessary for a specific request are managed by a policy manager and the resource manager communicates with the policy manager to process resource assignment and recovery.

The media server may have identifiers (IDs) for all operations related to playback. For example, the media server may send a command to a specific pipeline based on the ID. The media server may send respective commands to pipelines for playback of two or more media.

The media server is responsible for playing back a HTML5 standard media.

The media server performs a service process of a TV pipeline according to a TV restructuralization range. The media server may be designed and implemented regardless of the TV restructuralization range. If the separate service process of the TV is not performed, the TV may be wholly re-executed when errors occurs in a specific task.

The media server is also referred to as uMS, that is, a micro media server. The media player is a media client and means WebKit for HTML5 video tag, camera, TV, Skype or second screen, for example.

The media server mainly manages micro resources such as a resource manager or a policy manager. The media server also controls playback of web standard media content. The media server may manage pipeline controller resources.

The media server supports extensibility, reliability, efficient resource usage, etc., for example.

In other words, the uMS, that is, the micro media server, manages and controls resource usage for appropriate processing within the WebOS device, such as resources such as

cloud game, MVPD (pay service, etc.), camera preview, second screen or Skype, and TV resources. A pipeline is used upon usage of each resource, for example, and the media server may manage and control generation, deletion, use of a pipeline for resource management.

The pipeline may be generated when a media related to a task starts a sequence of request, decoding streaming and parsing such as video output. For example, in association with a TV service and an application, watching, recording, channel tuning, etc. are controlled and performed via pipelines individually generated according to requests thereof with respect to resource usage.

Referring to FIG. 10, a processing structure of a media server will be described in detail.

In FIG. 10, an application or service is connected to a media server 1020 via a Luna-service bus 1010 and the media server 1020 is connected to and managed by pipelines generated via the Luna-service bus 1010.

The application or service includes various clients according to properties thereof and may exchange data with the media server 1020 or the pipeline via the clients.

The clients include a uMedia client (WebKit) for connection with the media server 1020 and a resource manager (RM) client (C/C++), for example.

The application including the uMedia client is connected to the media server 1020 as described above. More specifically, the uMedia client corresponds to the below-described video object, for example, and uses the media server 1020, for video operation by a request, etc.

The video operation relates to a video status and may include all status data related to the video operation, such as loading, unloading, play (playback or reproduction), pause, stop, etc. Such video operations or statuses may be processed by generating individual pipelines. Accordingly, the uMedia client transmits status data related to the video operation to the pipeline manager 1022 in the media server.

The media server 1022 acquires information about resources of the current device via data communication with the resource manager 1024 and requests assignment of resources corresponding to the status data of the uMedia client. At this time, the pipeline manager 1022 or the resource manager 1024 controls resource assignment via data communication with the policy manager 1026 if necessary. For example, if resources to be assigned according to the request of the pipeline manager 1022 are not present or are lacking in the resource manager 1024, resource assignment may be appropriately performed according to priority comparison of the policy manager 1026.

The pipeline manager 1022 requests to generate a pipeline for operation according to the request of the uMedia client from the media pipeline controller 102, with respect to resources assigned according to resource assignment of the resource manager 1024.

The media pipeline controller 1028 generates a necessary pipeline under control of the pipeline manager 1022. As shown, a media pipeline, a camera pipeline, a pipeline related to playback, pause or stop may be generated. The pipeline includes pipelines for HTML5, web CP, Smarth-share playback, thumbnail extraction, NDK, cinema, multimedia and hypermedia information coding experts group (MHEG), etc.

The pipeline may include a service-based pipeline and a URI based pipeline (media pipeline), for example.

Referring to FIG. 10, the application or service including the RM client may not be directly connected to the media server 1020, because the application or service can directly process a media. In other words, if the application or service

directly processes a media, the media server may not be used. At this time, for pipeline generation and usage, resource management is necessary and, at this time, a uMS connector is used. When a resource management request for direct media processing of the application or service is received, the uMS connector communicates with the media server 1020 including the resource manager 1024. The media server 1020 also includes a uMS connector.

Accordingly, the application or service may cope with the request of the RM client via resource management of the resource manager 1024 via the uMS connector. The RM client may process services such as native CP, TV service, second screen, flash player, You Tube media source extensions (MSE), cloud game, Skype, etc. In this case, as described above, the resource manager 1024 may manage resources via appropriate data communication with the policy manager 1026 if necessary for resource management.

The URI based pipeline does not directly process the media unlike the above-RM client but processes the media via the media server 1020. The URI based pipeline may include player factory, Gstreamer, streaming plug-in, digital rights management (DRM) plug-in pipelines.

An interface method between the application and the media services is as follows.

An interface method using a service in a web application may be used. In this method, a Luna call method using a palm service bridge (PSB) and a method of using Cordova may be used, in which a display is extended to a video tag. In addition, a method of using HTML5 standard related to a video tag or media element may be used.

A method of using a service in PDK may be used.

Alternatively, a method of using in existing CP may be used. For backward compatibility, plug-in of an existing platform may be extended and used based on Luna.

Lastly, an interface method using a non-WebOS may be used. In this case, a Luna bus may be directly called to perform interfacing.

Seamless change is processed by a separate module (e.g., TVwin) and refers to a process of first displaying a TV program on a screen without a WebOS before or duration WebOS booting and then performing seamless processing. This is used for the purpose of first providing a basic function of a TV service, for fast response to a power-on request of a user, because a booting time of a WebOS is late. The module is a part of a TV service process and supports seamless change for providing fast booting and a basic TV function, factory mode, etc. The module is responsible for switching from the non-WebOS mode to the WebOS mode.

FIG. 11 shows the processing structure of the media server.

In FIG. 11, a solid box denotes a process component and a dotted box denotes an internal processing module of the process. A solid arrow denotes an inter-process call, that is, a Luna-service call and a dotted arrow denotes notification such as register/notify or data flow.

The service, the web application or the PDK application (hereinafter, referred to as "application") is connected to various service processing components via a Luna-service bus and is operated or controlled via the service processing components.

A data processing path is changed according to application type. For example, if the application includes image data related to a camera sensor, the image data is transmitted to and processed by a camera processor 1130. At this time, the camera processor 1130 includes a gesture or face detection module and processes image data of the received application. The camera processor 1130 may generate a

pipeline via a media server processor **1110** with respect to data which requires use of a pipeline according to user selection or automatically and process the data.

Alternatively, if the application includes audio data, the audio may be processed via an audio processor (AudioD) **1140** and an audio module (PulseAudio) **1150**. For example, the audio processor **1140** processes the audio data received from the application and transmits the processed audio data to the audio module **1150**. At this time, the audio processor **1140** may include an audio policy manager to determine processing of the audio data. The processed audio data is processed by the audio module **1150**. The application or a pipeline related thereto may notify the audio module **1150** of data related to audio data processing. The audio module **1150** includes advanced Linux sound architecture (ALSA).

Alternatively, if the application includes or processes (hereinafter, referred to as “includes”) content subjected to DRM, the content data is transmitted to a DRM service processor **1160** and the DRM service processor **1160** generates a DRM instance and processes the content data subjected to DRM. The DRM service processor **1160** is connected to a DRM pipeline in a media pipeline via a Luna-service bus, for processing of the content data subjected to DRM.

Hereinafter, processing of an application including media data or TV service data (e.g., broadcast data) will be described.

FIG. **12** shows the media server processor and the TV service processor of FIG. **11** in detail.

Accordingly, a description will be given with reference to FIGS. **11** and **12**.

First, if the application includes TV service data, the application is processed by the TV service processor **1120/1220**.

The TV service processor **1120** includes at least one of a DVR/channel manager, a broadcast module, a TV pipeline manager, a TV resource manager, a data broadcast module, an audio setting module, a path manager, etc., for example. In FIG. **12**, the TV service processor **1220** may include a TV broadcast handler, a TV broadcast interface, a service processor, TV middleware (MW), a path manager and a BSP (NetCast). The service processor may mean a module including a TV pipeline manager, a TV resource manager, a TV policy manager, a USM connector, etc., for example.

In the present specification, the TV service processor may have the configuration of FIG. **11** or FIG. **12** or a combination thereof. Some components may be omitted or other components (not shown) may be added.

The TV service processor **1120/1220** transmits DVR or channel related data to a DVR/channel manager and transmits the DVR or channel related data to the TV pipeline manager to generate and process a TV pipeline, based on attribute or type of the TV service data received from the application. If the attribute or type of the TV service data is broadcast content data, the TV service processor **1120** generates and processes a TV pipeline via the TV pipeline manager, for processing of the data via a broadcast module.

Alternatively, a JavaScript standard object notation (json) file or a file written in c is processed by the TV broadcast handler and transmitted to the TV pipeline manager via a TV broadcast interface to generate and process a TV pipeline. In this case, the TV broadcast interface may transmit the data or file passing through the TV broadcast handler to the TV pipeline manager based on TV service policy and refer to the data or file upon generating a pipeline.

The TV pipeline manager generates one or more pipelines according to a request for generation of a TV pipeline from

the processing module or manager of the TV service processor, under control of the TV resource manager. The TV resource manager may be controlled by the TV policy manager, in order to request a resource assignment status for a TV service according to a request for generation of a TV pipeline of the TV pipeline manager, and may perform data communication with the media server processor **1110/1210** via a uMS connector. The resource manager in the media server processor **1110/1210** sends the resource assignment status for the TV service according to the request of the TV resource manager. For example, if the resource manager in the media server processor **1110/1210** determines that the resources for the TV service are already assigned, the TV resource manager may be notified that assignment of all resources is completed. At this time, the resource manager in the media server processor may remove a predetermined TV pipeline according to a predetermined criterion or priority of TV pipelines already assigned for the TV service along with notification and request generation of a TV pipeline for the requested TV service. Alternatively, the TV resource manager may appropriately remove a TV pipeline or may add or newly establish a TV pipeline according to a status report of the resource manager in the media server processor **1110/1210**.

The BSP supports backward compatibility with an existing digital device.

The generated TV pipelines may appropriately operate under control of the path manager in the processing procedure. The path manager may determine or control the processing path or procedure of the pipelines in consideration of the TV pipeline in the processing procedure and the operation of the pipelines generated by the media server processor **1110/1210**.

Next, if the application includes media data, not TV service data, the application is processed by the media server processor **1110/1210**. The media server processor **1110/1210** includes a resource manager, a policy manager, a media pipeline manager, a media pipeline controller, etc. As pipelines generated under control of the media pipeline manager and the media pipeline controller, a camera preview pipeline, a cloud game pipeline, a media pipeline, etc. may be generated. The media pipeline may include streaming protocol, auto/static gstreamer, DRM, etc. and the processing flow thereof may be determined under control of the path manager. For a detailed description of the processing procedure of the media server processor **1110/1210**, refer to the description of FIG. **10** and a repeated description will be omitted. In the present specification, the resource manager in the media server processor **1110/1210** may perform resource management to a counter base, for example.

Embodiments of the present invention are described with reference to FIGS. **13** to **24** as follows. First of all, in describing and understanding the embodiments of the present invention in the following description, the former contents mentioned in association with FIGS. **1** to **12** can be referred to. Secondly, the display or digital device mentioned in the foregoing description may include a display device according to one embodiment of the present specification.

The display device described in the present specification may conceptually include one a TV, a smart TV, a hybrid broadcast broadband television (HBBTV), a network TV, a web TV, an internet protocol television (IPTV), a personal computer, a tablet PC, a notebook, a netbook, a PMP, a smartphone, a smartwatch, a smart glass, a navigation, and the like for example.

FIG. 13 is a block diagram for configuration modules of a digital device according to one embodiment of the present invention.

Referring to FIG. 13, a digital device 1300 according to one embodiment of the present invention may include a communication unit 1310, a display unit 1320, a controller 1330, a memory 1340, and the like. The configuration modules shown in FIG. 13 and other configuration modules failing to be shown in FIG. 13 can refer to the configurations shown in FIGS. 1 to 12.

The communication unit 1310 may receive a broadcast signal containing broadcast program data, a content and the like from a TV broadcast server (e.g., a terrestrial broadcasting station server, a cable broadcasting server, etc.) or a content provider (CP) and may also receive a service, an application, a content and the like from an external server through a network. And, the communication unit 1310 can connect a communication to transceive data with at least one external mobile terminal. Moreover, the communication unit 1310 may be embodied into at least one of the network interface unit 201 shown in FIG. 2, the wireless communication unit 310 shown in FIG. 3, and the receiving unit 405 shown in FIG. 4.

The display unit 1320 may display video data, graphic data, image data and the like, each of which corresponds to a received content. And, the display unit 1320 may display video data, graphic data and image data saved in the memory 1340 in advance. Moreover, the display unit 1320 may be embodied into at least one of the display unit 208 shown in FIG. 2, the display unit 351 shown in FIG. 3, and the display unit 480 shown in FIG. 4.

The memory 1310 may store various programs, applications, algorithms and the like, which are required for operations of the digital device 1300. The memory 1340 may store contents, programs, data, applications and the like, which are received through the communication (or receiving) unit 1310. And, the memory 1340 may be embodied into the SI & metadata database 211 shown in FIG. 2, the memory 360 shown in FIG. 3, and the storage unit 440 shown in FIG. 4.

The controller 1330 controls operations of the digital device 1300 and also manages functions of the communication (or receiving) unit 1310, the display unit 1320 and the memory 1340 overall. And, the controller 1330 may include a decoder configured to process video and audio data of the content received by the communication (or receiving) unit 1310.

The controller 1330 may be embodied into at least one of the TCP/IP manager 201 shown FIG. 2, the service delivery manager 203 shown in FIG. 2, the SI decoder 204 shown in FIG. 2, the demux 205 shown in FIG. 2, the audio decoder 206 shown in FIG. 2, the video decoder 207 shown in FIG. 2, the service control manager 209 shown in FIG. 2, the service discovery manager 210 shown in FIG. 2, the service manager 213 shown in FIG. 2, the controller 380 shown in FIG. 3, the controller 470 shown in FIG. 4, the media server 1020 shown in FIG. 2, the media server processing unit 1110 shown in FIG. 11, the TV service processing unit 1120 shown in FIG. 11, the media server processing unit 1210 shown in FIG. 12, the TV service processing unit 1220 shown in FIG. 12, and the like.

Meanwhile, according to one embodiment of the present invention, while communications with a plurality of external mobile terminals are connected, in case of recognizing an occurrence of an event related to a personalization information of a specific external mobile terminal, a signal for indicating the event occurrence can be transmitted to the specific external mobile terminal and a command signal can

be received from the specific external mobile terminal. This is described in detail with reference to FIG. 14 as follows.

FIG. 14 is a flowchart to describe one example of a method of receiving a command signal from a specific external mobile terminal in case of an occurrence of an event related to personalization information of the specific external mobile terminal in a display device.

Referring to FIG. 14, the controller 1330 of the display device 1300 can control the display unit 1320 to display a first content. In this case, the first content may include at least one of a broadcast program currently broadcasted on a specific channel included in a broadcast signal, an advertisement currently broadcasted on a specific channel, an application saved in the memory 1340, a VOD (video on demand) data received from a specific external server, an image (or video) data displayed by real-time streaming through a specific external server, and the like.

The controller 1330 can control the communication unit 1310 to connect communications with a plurality of external mobile terminals [S1410]. In doing so, since the number of the external mobile terminals is non-limited, a plurality of the external mobile terminals may be substituted with a single external mobile terminal. In particular, as a preset application (e.g., a remote controller application) saved in a memory of each of a plurality of the external mobile terminals is run, if a specific signal is transmitted from each of a plurality of the external mobile terminals, the controller 1330 can connect communications with a plurality of the external mobile terminals.

In the step S1410, the communication unit 1310 connects wireless communications with a plurality of the external mobile terminals in general. Instead, wired communications may be connected by the communication unit 1310.

In the step S1410, each of a plurality of the communication-connected external mobile terminals may include the digital device 300 shown in FIG. 3 for example, by which types of the communication-connected external mobile terminals are non-limited. For instance, each of a plurality of the communication-connected external mobile terminals may include one of a watch type mobile terminal, a glass type mobile terminal, and the like.

The controller 1330 can obtain a personalization information corresponding to each of a plurality of the external mobile terminals [S1420]. In this case, the personalization information may include at least one of a personal content list, a personal application list, and a personal advertisement list.

The personal content list is a content list saved in the memory of the each of a plurality of the external mobile terminals and may include one of a content list (e.g., a channel list, a program list, a VOD list, etc.), a preferred content list (e.g., a preferred channel list, a preferred program list, a preferred VOD list, etc.), a content list (e.g., a frequently watched channel list, a frequently watched program list, a frequently watched VOD list, etc.) frequently watched by a user of the each of a plurality of the external mobile terminals, and the like.

For instance, in case that a channel list (e.g., Channel 3 and Channel 4) is saved in a memory of a first external mobile terminal among a plurality of the external mobile terminals, a personal content list of the first external mobile terminal may include a channel list (e.g., Channel 3 and Channel 4) saved in the memory of the first external mobile terminal.

For another instance, in case that Channel 23 is saved as a preferred channel in a memory of a second external mobile

terminal among a plurality of the external mobile terminals, a personal content list of the second external mobile terminal may become Channel 23.

For another instance, in case that a first program is saved as a program frequently watched by a user of a third external mobile terminal in a memory of the third external mobile terminal among a plurality of the external mobile terminals, the first program may become a personal content list of the third external mobile terminal.

For further instance, if a first VOD and a second programs are saved as a preferred VOD and a frequently watched program in a memory of a fourth external mobile terminal among a plurality of the external mobile terminals, respectively, the first VOD and the second program may become a personal content list of the fourth external mobile terminal.

The personal application list is a list of applications installed on the display device 1300 saved in the memory of the each of a plurality of the external mobile terminals and may include one of an application list, an application list frequently used by the user of the each of a plurality of the external mobile terminals, a preferred application list, and the like.

For instance, in case that a list of applications (e.g., first application and second application) installed on the display device 1300 is saved in the memory of the first external mobile terminal among a plurality of the external mobile terminals, a personal application list of the first external mobile terminal may include an application list (e.g., first application and second application) saved in the memory of the first external mobile terminal.

For another instance, in case that a first application is saved as an application frequently used by a user of the second external terminal among a plurality of the external mobile terminals in the memory of the second external mobile terminal, the first application can become the personal application list.

The personal advertisement list is an advertisement list saved in the memory of the each of a plurality of the external mobile terminals and may include an advertisement of the field, in which the user of the each of a plurality of the external mobile terminals is interested.

For instance, if a user of the first external mobile terminal among a plurality of the external mobile terminals frequently searches for a first product using the first external mobile terminal, the first product can become the personal advertisement list.

For another instance, if a user of the second external mobile terminal among a plurality of the external mobile terminals frequently searches for a tour product using the second external mobile terminal, the tour product can become the personal advertisement list.

In the step S1420, the controller 1330 controls the communication unit 1310 to receive the personalization information from the each of a plurality of the external mobile terminals and may be able to obtain the personalization information corresponding to the each of a plurality of the external mobile terminals using the received personalization information. In doing so, the personalization information corresponding to the each of a plurality of the external mobile terminals can be saved to the memory 1340. Yet, in case that the personalization information corresponding to the each of a plurality of the external mobile terminals is already saved in the memory 1340, the controller 1330 can update the personalization information, which is already saved in the memory 1340, corresponding to the each of a plurality of the external mobile terminals.

In the step S1420, the personalization information of the each of a plurality of the external mobile terminals may have been saved in the memory 1340. Using the corresponding personalization information saved in the memory 1340, the controller 1330 may obtain the personalization information corresponding to the each of a plurality of the external mobile terminals.

After the step S1420, the controller 1330 can recognize an occurrence of an event related to a personalization information of a specific external mobile terminal [S1430]. In this case, the specific external mobile terminal may include an external mobile terminal having transmitted to the personalization information corresponding to the event occurrence among a plurality of the communication-connected external mobile terminals.

In particular, the controller 1330 can control the communication unit 1310 to receive update information related to at least one of a content, an application and an advertisement from an external server. If the received update information corresponds to the personalization information of the specific external mobile terminal, the controller 1330 may recognize that the event has occurred.

For clarity of the description of the step S1430, assume that a first external mobile terminal and a second external mobile terminal are connecting communications. Assume that a first content is included in the personalization information of the first external mobile terminal. And, assume that a first application is included in the personalization information of the second external mobile terminal.

For instance, in case that an update information of the first content is received from an external server, since the update information corresponds to the personalization information of the first external mobile terminal, the controller 1330 may recognize that the event has occurred.

For another instance, in case that an update information of the first application is received from an external server, since the update information corresponds to the personalization information of the second external mobile terminal, the controller 1330 may recognize that the event has occurred. In this case, the update information may include information indicating that the first application itself has been updated or information indicating that a content (e.g., VOD data, etc.) displayed through the first application has been updated.

Meanwhile, in the step S1430, according to an embodiment, if the first content corresponds to the personalization information of the specific external mobile terminal, the controller 1330 may recognize that the event has occurred.

For instance, since the first content displayed through the display unit 1320 corresponds to the personalization information of the first external mobile terminal, the controller 1330 may recognize that the event has occurred.

In case that the controller 1330 recognizes the event occurrence in the step S1430, the controller 1330 can control the communication unit 1310 to transmit a signal indicating the event occurrence to the specific external mobile terminal [S1440].

In particular, if the controller 1330 recognizes the occurrence of the event related to the first external mobile terminal, the controller 1330 can control the communication unit 1310 to transmit the signal indicating the event occurrence to the first external mobile terminal. On the other hand, if the controller 1330 recognizes an occurrence of an event related to the first external mobile terminal and the second external mobile terminal, the controller 1330 can control the communication unit 1310 to transmit a signal indicating the

event occurrence to the first external mobile terminal and the second external mobile terminal.

For instance, if the controller **1330** receives an update information of a content corresponding to the personalization information of the first external mobile terminal from the external server, the controller **1330** recognizes that the event has occurred and is then able to control the communication unit **1310** to transmit a signal indicating the event occurrence to the first external mobile terminal.

For another instance, if the controller **1330** receives an update information of a content corresponding to the personalization information of the first external mobile terminal from the external server and also receives an update information of an application corresponding to the personalization information of the second external mobile terminal from the external server, the controller **1330** may recognize that the event has occurred. And, the controller **1330** can control the communication unit **1310** to transmit a signal indicating the event occurrence to the first external mobile terminal and the second external mobile terminal and is also able to control the communication unit **1310** to transmit a signal indicating an occurrence of the event related to the second external mobile terminal to the second external mobile terminal.

For another instance, when a content corresponding to the personalization information of the first external mobile terminal is identical to a content corresponding to the personalization information of the second external mobile terminal, if the controller **1330** receives an update information of the same content from the external server, the controller **1330** can control the communication unit **1310** to transmit a signal indicating the event occurrence to the first external mobile terminal and the second external mobile terminal.

After the step **S1440**, the controller **1330** can control the communication unit **1310** to receive a command signal for controlling the display device **1300** from the specific external mobile terminal [**S1450**].

For instance, the command signal is the signal for controlling the display device **1300**, and may include one of a control signal corresponding to a function of recording a content other than a content currently displayed through the display unit **1320** of the display device **1300**, a control signal for switching a channel, a control signal for registering a watching reservation, a control signal for registering a recording reservation, a control signal for updating an application, a control signal for displaying an advertisement through the display unit **1320**, a control signal for displaying at least two contents on the display unit **1320** at a time by partitioning a screen, and the like.

In the step **S1450**, if the controller **1330** receives the command signal, the controller **1330** can control the display device **1300**.

According to the present embodiment, while several persons are watching a specific content using a single display device, if a specific event occurs, a signal indicating the occurrence of the specific event can be transmitted to a mobile terminal of a user who is interested in the specific event only and the display device can be controlled. Therefore, the present embodiment is advantageous in minimizing the interruption in watching the specific content.

FIG. **15** is a flowchart to describe one example of a method of transmitting a command signal to a display device in viewpoint of a mobile terminal having a communication connected to a display device according to one embodiment of the present invention.

First of all, regarding the present embodiment, a mobile terminal having a communication connected to a display device is described by taking the digital device **300** shown in FIG. **3** as one example, by which types of the communication-connected mobile terminals is non-limited. For instance, the mobile terminal having the communication connected to the display device may include one of a watch type mobile terminal, a glass type mobile terminal, and the like.

Referring to FIG. **15**, the controller **380** of the mobile terminal **300** can control the wireless communication unit **310** to connect a communication with a preset external display device [**S1510**]. In particular, a preset application (e.g., a remote controller application, etc.) may be saved in the memory **370**. In response to a command for running the preset application, the controller **380** can search for at least one external display device that is communication-connectible. Subsequently, the controller **380** can connect a communication with a preset external display device selected by a user of the mobile terminal **300** from the found at least one or more display devices. In this case, the at least one external display device may include a display device spaced apart from the mobile terminal **300** in a preset distance. And, a wireless communication is connected to the preset external display device in general. Moreover, a wired communication may be connected to the preset external display device.

Personalization information corresponding to the mobile terminal **300** may be saved in the memory **370** of the mobile terminal **300**. In this case, the personalization information corresponding to the mobile terminal **300** may include at least one of a personal content list, a personal application list, and a personal advertisement list.

The personal content list is a content list saved in the memory **370** of the mobile terminal **300** and may include one of a content list (e.g., a channel list, a program list, a VOD list, etc.), a preferred content list (e.g., a preferred channel list, a preferred program list, a preferred VOD list, etc.), a content list (e.g., a frequently watched channel list, a frequently watched program list, a frequently watched VOD list, etc.) frequently watched by a user of the mobile terminal **300**, and the like.

The personal application list is a list of applications installed on the preset external display device saved in the memory **370** and may include one of an application list, an application list frequently used by the user of the mobile terminal **300**, a preferred application list, and the like.

The personal advertisement list is an advertisement list saved in the memory **370** and may include an advertisement of the field, in which the user of the mobile terminal is interested.

The controller **1330** can control the communication unit **110** to transmit the personalization information to the preset external display device [**S1520**].

The controller **380** can receive a signal indicating an occurrence of an event from the preset external display device [**S1530**]. In this case, the event may include an event corresponding to the personalization information saved in the memory **370** of the mobile terminal **300**.

For instance, if the preset external display device **1300** receives an update information related to at least one of a content, an application and an advertisement from the external server, the preset external display device **1300** recognizes that the event has occurred and is able to transmit a signal indicating the event occurrence to the mobile terminal currently storing the personalization information corresponding to the event occurrence in the memory **370**. Hence,

the mobile terminal **300** can receive the signal indicating that the event corresponding to the personalization information has occurred in the preset external display device **1300**.

For another instance, if a content currently displayed on the preset external display device **1300** corresponds to the personalization information saved in the memory **370** of the mobile terminal **300**, the controller **380** of the mobile terminal **300** can control the wireless communication unit **310** to receive the signal indicating that the event corresponding to the personalization information has occurred from the preset external display device **1300**.

Meanwhile, when the signal is received in the step **S1530**, the controller **380** of the mobile terminal **300** can control the display unit **351** to display a specific message [**S1540**]. For instance, the specific message may include a content indicating that the event corresponding to the personalization information has occurred in the preset external display device **1300**. And, the specific message may include at least one content corresponding to a specific function.

The controller **380** may control the wireless communication unit **310** to transmit a command signal for running the specific function in the preset external display device **1300** to the preset external display device **1300** through the specific message [**S1550**].

For instance, the command signal is the signal for controlling the preset external display device **1300**, and may include one of a control signal corresponding to a function of recording a content other than a content currently displayed through the display unit **1320** of the display device **1300**, a control signal for switching a channel, a control signal for registering a watching reservation, a control signal for registering a recording reservation, a control signal for updating an application, a control signal for displaying an advertisement through the display unit **1320**, a control signal for displaying at least two contents on the display unit **1320** at a time by partitioning a screen, and the like.

Accordingly, the present embodiment provides the following advantages. First of all, a user of the mobile terminal **300** can recognize that an event related to the mobile terminal **300** has occurred in a display device through the mobile terminal **300**. Secondly, the user of the mobile terminal **300** can control the display device in direct through the mobile terminal **300**.

A display device according to one embodiment of the present invention connects communications with a plurality of external mobile terminals. In case that an event corresponding to a personalization information of a specific mobile terminal occurs, the display device transmits a signal indicating the event occurrence to the specific mobile terminal only and is then able to receive a command signal from the specific mobile terminal. This is described in detail with reference to FIGS. **16** to **23** as follows.

FIG. **16** is a diagram to describe one example of a method of obtaining personalization information in a display device according to one embodiment of the present invention. Regarding the description with reference to FIG. **16**, the substance redundant with the foregoing descriptions with reference to FIG. **14** and FIG. **15** shall not be mentioned again and the following description shall be made centering on the differences.

Referring to FIG. **16**, the display device **1300** can control the communication unit **1310** to connect communications with a plurality of mobile terminals. In this case, each of a plurality of the mobile terminals may include a smartphone **A1**, a glass type mobile terminal **A2**, or a watch type mobile terminal **A3**, by which the present invention is non-limited.

A GUI indicating that the communication is connected can be outputted through each of a plurality of the communication-connected mobile terminals **A1**, **A2** and **A3**. For instance, in case that the communication-connected mobile terminal is the watch type mobile terminal **A3**, the GUI can be displayed on a display unit.

Meanwhile, the controller **1330** can obtain personalization information from each of a plurality of the communication-connected mobile terminals **A1**, **A2** and **A3**.

For instance, the controller **1330** can obtain personalization information of each of a plurality of the communication-connected external mobile terminals **A1**, **A2** and **A3** by receiving the personalization information from each of a plurality of the communication-connected external mobile terminals **A1**, **A2** and **A3**.

For another instance, a personalization information of at least one mobile terminal may be saved in the memory **1340**. And, the controller **1330** may obtain the personal information of each of a plurality of the communication-connected mobile terminals **A1**, **A2** and **A3** using the personalization information of the at least one mobile terminal saved in the memory **1340**. In particular, the personalization information received from a previously communication-connected at least one mobile terminal may be saved in the memory **1340**.

If the communications are connected to a plurality of the mobile terminals **A1**, **A2** and **A3**, the controller **1330** can search the personalization information of the at least one mobile terminal saved in the memory for the personalization information corresponding to each of a plurality of the mobile terminals **A1**, **A2** and **A3**. And, the controller **1330** is able to obtain the personalization information of each of a plurality of the mobile terminals **A1**, **A2** and **A3** using the found personalization information respectively corresponding to a plurality of the mobile terminals **A1**, **A2** and **A3**.

Meanwhile, according to one embodiment of the present invention, if there occurs an event related to a personalization information of a specific external mobile terminal among a plurality of external mobile terminals, the controller **1330** can control the communication unit **1310** to transmit a signal indicating the event occurrence to the specific external mobile terminal. This is described further in detail with reference to FIG. **17** as follows.

FIG. **17** is a diagram to describe one example of a method of transmitting a signal indicating an event occurrence to a specific external mobile terminal from a display device and receiving a command signal for controlling the display device according to one embodiment of the present invention. Regarding the description with reference to FIG. **17**, the substance redundant with the foregoing descriptions with reference to FIGS. **14** to **16** shall not be mentioned again and the following description shall be made centering on the differences.

First of all, for clarity of the description of the present invention, a plurality of external mobile terminals **A1**, **A2** and **A3** communication-connected to the display device **1300** are described by taking the digital device described with reference to FIG. **3** as examples, by which the present invention is non-limited.

Referring to FIG. **17**, the controller **1330** of the display device **1300** can recognize an occurrence of an event related to a personalization information of a specific external mobile terminal among a plurality of communication-connected external mobile terminals.

For instance, while a first content **1610** is displayed on the display unit **1320**, the controller **1330** can receive an update information of a second content different from the first content from an external server. If the second content is

included in the personalization information of a first external mobile terminal **A1**, the controller **1330** can recognize that an event related to the personalization information of the first external mobile terminal **A1** has occurred.

For another instance, assuming that the first content is included in the personalization information of the first external mobile terminal **A1**, if the first content **1610** is displayed on the display unit **1320**, the controller **1330** can recognize that the event related to the personalization information of the first external mobile terminal **A1** has occurred. In particular, the controller **1330** can recognize that an event related to an external mobile terminal having a personalization information related to a content currently displayed through the display unit **1320** has occurred.

In case of recognizing the event occurrence, the controller **1330** can control the communication unit **1310** to transmit a signal indicating the event occurrence to the specific external mobile terminal.

For instance, the controller **1330** can control the communication unit **1410** to transmit a signal indicating the event occurrence to a specific external mobile terminal (e.g., first external mobile terminal **A1**) related to the event among a plurality of the external mobile terminals **A1**, **A2** and **A3**.

Meanwhile, as the first external mobile terminal **A1** receives the signal, it is able to output a specific message **1720**. For instance, the specific message **1720** may contain a substance for confirming whether to record a content related to the event.

For instance, in case that the content related to the event is the first content **1610** currently displayed on the display device **1300**, the message may contain the substance for confirming whether to record the first content **1610**.

If a user inputs a command for ordering to execute the recording through the message, the controller **1330** of the display device **1300** can control the communication unit **1310** to receive a command signal for controlling the display device from the first external mobile terminal **A1**.

If the command signal is received, the controller **1330** can control the display device **1300**.

For instance, if a command for ordering to record the first content is included in the command signal, the controller **1330** can control the display device **1300** to record the first content.

For another instance, if a command for ordering to record the second content is included in the command signal, the controller **1330** can control the display device **1300** to record the second content without displaying the second content. In particular, the controller **1330** can continue to display the first content while recording the second content in the background.

According to the present embodiment, while several persons are watching a specific content using a single display device, if a specific event occurs, a signal indicating the occurrence of the specific event can be transmitted to a mobile terminal of a user who is interested in the specific event only and the display device can be controlled. Therefore, the present embodiment is advantageous in minimizing the interruption in watching the specific content.

FIG. **18** is a diagram to describe another example of a method of transmitting a signal indicating an event occurrence to a specific external mobile terminal from a display device and receiving a command signal for controlling the display device according to one embodiment of the present invention. Regarding the description with reference to FIG. **18**, the substance redundant with the foregoing descriptions

with reference to FIGS. **14** to **17** shall not be mentioned again and the following description shall be made centering on the differences.

First of all, for clarity of the description of the present invention, a plurality of external mobile terminals **A1**, **A2** and **A3** communication-connected to the display device **1300** are described by taking the digital device described with reference to FIG. **3** as examples, by which the present invention is non-limited.

Referring to FIG. **18**, the controller **1330** of the display device **1300** can recognize an occurrence of an event related to a personalization information of a specific external mobile terminal among a plurality of communication-connected external mobile terminals.

For instance, while a first content **1610** is displayed on the display unit **1320**, if the controller **1330** recognizes that a second content different from the first content is scheduled to be broadcasted on a different channel, the controller **1330** can recognize that an event related to the personalization information of the second external mobile terminal **A2** has occurred. In this case, the second content may be included in the personalization information of the second external mobile terminal **A2**.

In case of recognizing the event occurrence, the controller **1330** can control the communication unit **1310** to transmit a signal indicating the event occurrence to the specific external mobile terminal.

For instance, the controller **1330** can control the communication unit **1310** to transmit a signal indicating the event occurrence to a specific external mobile terminal (e.g., second external mobile terminal **A2**) related to the event among a plurality of the external mobile terminals **A1**, **A2** and **A3**.

Meanwhile, as the second external mobile terminal **A2** receives the signal, it is able to output a specific message **1720**. For instance, the specific message **1720** may contain information on a channel scheduled to broadcast the content related to the event, information on a broadcast schedule time of the content related to the event, and an indicator **1721** corresponding to a function of switching a channel to the channel scheduled to broadcast the content related to the event.

If a user touches the indicator **1721** contained in the specific message, the controller **1330** of the display device **1300** can control the communication unit **1310** to receive a command signal for controlling the display device from the second external mobile terminal **A2**.

If the command signal is received, the controller **1330** can control the display device **1300**.

For instance, if a command for ordering to switch the channel to the channel scheduled to broadcast the second content is included in the command signal, the controller **1330** can switch the channel to the channel scheduled to broadcast the second content.

According to the present embodiment, while several persons are watching a specific content using a single display device, if a specific event occurs, a signal indicating the occurrence of the specific event can be transmitted to a mobile terminal of a user who is interested in the specific event only and the display device can be controlled. Therefore, the present embodiment is advantageous in minimizing the interruption in watching the specific content.

FIG. **19** is a diagram to describe another example of a method of transmitting a signal indicating an event occurrence to a specific external mobile terminal from a display device and receiving a command signal for controlling the display device according to one embodiment of the present

invention. Regarding the description with reference to FIG. 19, the substance redundant with the foregoing descriptions with reference to FIGS. 14 to 18 shall not be mentioned again and the following description shall be made centering on the differences.

First of all, for clarity of the description of the present invention, a plurality of external mobile terminals A1, A2 and A3 communication-connected to the display device 1300 are described by taking the digital device described with reference to FIG. 3 as examples, by which the present invention is non-limited.

Referring to FIG. 19, the controller 1330 of the display device 1300 can recognize an occurrence of an event related to a personalization information of a specific external mobile terminal among a plurality of communication-connected external mobile terminals.

For instance, while a first content 1610 is displayed on the display unit 1320, if an update information of a second content different from the first content is received from an external server, the controller 1330 can recognize that an event related to the personalization information of the third external mobile terminal A3 has occurred. In this case, the second content may be included in the personalization information of the third external mobile terminal A3.

In case of recognizing the event occurrence, the controller 1330 can control the communication unit 1310 to transmit a signal indicating the event occurrence to the specific external mobile terminal.

For instance, the controller 1330 can control the communication unit 1310 to transmit a signal indicating the event occurrence to a specific external mobile terminal (e.g., third external mobile terminal A3) related to the event among a plurality of the external mobile terminals A1, A2 and A3.

Meanwhile, as the third external mobile terminal A2 receives the signal, it is able to output a specific message 1730. For instance, the specific message 1730 may contain at least one of information indicating that the second content related to the event has been updated, a first indicator 1731 corresponding to a function of registering a watching reservation of the second content at the display device 1300, a second indicator 1732 corresponding to a function of enabling the second content to be directly watched through the display device 1300, and a third indicator 1733 corresponding to a function of registering a recording reservation of the second content at the display device 1300.

If a user touches one of a plurality of the indicators 1731 to 1733 contained in the specific message 1730, the controller 1330 of the display device 1300 can control the communication unit 1310 to receive a command signal for controlling the display device from the third external mobile terminal A3 in response to the touched indicator.

If the command signal is received, the controller 1330 can control the display device 1300.

For instance, as the user of the third external mobile terminal A3 selects the first indicator 1731, if the command signal is received, the controller 1330 can register the watching reservation of the second content. In doing so, the controller 1330 can register the watching reservation of the second content in the background while outputting the first content on the display unit 1320.

For another instance, as the user of the third external mobile terminal A3 selects the second indicator 1732, if the command signal is received, the controller 1330 can control the second content to be displayed instead of the first content 1610.

For further instance, as the user of the third external mobile terminal A3 selects the third indicator 1733, if the

command signal is received, the controller 1330 can register the recording reservation of the second content. In doing so, the controller 1330 can register the recording reservation of the second content in the background while outputting the first content on the display unit 1320.

According to the present embodiment, while several persons are watching a specific content using a single display device, if a specific event occurs, a signal indicating the occurrence of the specific event can be transmitted to a mobile terminal of a user who is interested in the specific event only and the display device can be controlled. Therefore, the present embodiment is advantageous in minimizing the interruption in watching the specific content.

FIG. 20 is a diagram to describe another example of a method of transmitting a signal indicating an event occurrence to a specific external mobile terminal from a display device and receiving a command signal for controlling the display device according to one embodiment of the present invention. Regarding the description with reference to FIG. 20, the substance redundant with the foregoing descriptions with reference to FIGS. 14 to 19 shall not be mentioned again and the following description shall be made centering on the differences.

First of all, for clarity of the description of the present invention, a plurality of external mobile terminals A1, A2 and A3 communication-connected to the display device 1300 are described by taking the digital device described with reference to FIG. 3 as examples, by which the present invention is non-limited.

Referring to FIG. 20, the controller 1330 of the display device 1300 can recognize an occurrence of an event related to a personalization information of a specific external mobile terminal among a plurality of communication-connected external mobile terminals.

For instance, while a first content 1610 is displayed on the display unit 1320, if an update information of a first application is received from an external server, the controller 1330 can recognize that an event related to the personalization information of the first external mobile terminal A1 has occurred. In this case, the first application may be included in the personalization information of the first external mobile terminal A1.

In case of recognizing the event occurrence, the controller 1330 can control the communication unit 1310 to transmit a signal indicating the event occurrence to the specific external mobile terminal.

For instance, the controller 1330 can control the communication unit 1310 to transmit a signal indicating the event occurrence to a specific external mobile terminal (e.g., first external mobile terminal A1) related to the event among a plurality of the external mobile terminals A1, A2 and A3.

Meanwhile, as the first external mobile terminal A1 receives the signal, it is able to output a specific message 1740. For instance, the specific message 1740 may contain information indicating that the first application related to the event has been updated and a substance for confirming whether to update the first application.

If a user inputs a command for ordering to update the first application using the specific message 1740, the controller 1330 of the display device 1300 can control the communication unit 1310 to receive a command signal for controlling the display device 1300 from the first external mobile terminal A1.

If the command signal is received, the controller 1330 can control the display device 1300.

For instance, if the command for ordering to update the first application is included in the command signal, the

controller 1330 can control the communication unit 1310 to connect a communication with the external server and to receive update data of the first application. Subsequently, the controller 1330 can update the first application using the received update data. In doing so, the controller 1330 may update the first application in the background and may be able to control the communication unit 1310 to transmit information related to a progress rate of an update to the first external mobile terminal A1.

According to the present embodiment, while several persons are watching a specific content using a single display device, if a specific event occurs, a signal indicating the occurrence of the specific event can be transmitted to a mobile terminal of a user who is interested in the specific event only and the display device can be controlled. Therefore, the present embodiment is advantageous in minimizing the interruption in watching the specific content.

FIG. 21 is a diagram to describe further example of a method of transmitting a signal indicating an event occurrence to a specific external mobile terminal from a display device and receiving a command signal for controlling the display device according to one embodiment of the present invention. Regarding the description with reference to FIG. 21, the substance redundant with the foregoing descriptions with reference to FIGS. 14 to 20 shall not be mentioned again and the following description shall be made centering on the differences.

First of all, for clarity of the description of the present invention, a plurality of external mobile terminals A1, A2 and A3 communication-connected to the display device 1300 are described by taking the digital device described with reference to FIG. 3 as examples, by which the present invention is non-limited.

Referring to FIG. 21, the controller 1330 of the display device 1300 can recognize an occurrence of an event related to a personalization information of a specific external mobile terminal among a plurality of communication-connected external mobile terminals.

For instance, while a first content 1610 is displayed on the display unit 1320, if an update information of an advertisement for a first product is received from an external server, the controller 1330 can recognize that an event related to the personalization information of the first external mobile terminal A1 has occurred. In this case, the advertisement for the first product may be included in the personalization information of the first external mobile terminal A1.

For another instance, if the first content 1610 currently displayed on the display unit 1320 is the advertisement for the first product, the controller 1330 can recognize that an event related to the personalization information of the first external mobile terminal A1 has occurred. In this case, the advertisement for the first product may be included in the personalization information of the first external mobile terminal A1.

In case of recognizing the event occurrence, the controller 1330 can control the communication unit 1310 to transmit a signal indicating the event occurrence to the specific external mobile terminal.

For instance, the controller 1330 can control the communication unit 1310 to transmit a signal indicating the event occurrence to a specific external mobile terminal (e.g., first external mobile terminal A1) related to the event among a plurality of the external mobile terminals A1, A2 and A3.

Meanwhile, as the first external mobile terminal A1 receives the signal, it is able to output a specific message

1740. For instance, the specific message 1740 may contain a substance for confirming whether to watch the advertisement.

If a user inputs a command for ordering to watch the advertisement using the specific message 1740, the controller 1330 of the display device 1300 can control the communication unit 1310 to receive a command signal for controlling the display device 1300 from the first external mobile terminal A1.

If the command signal is received, the controller 1330 can control the display device 1300.

For instance, if the command for ordering to watch the advertisement is included in the command signal, the controller 1330 can control the display unit 1320 to display the advertisement.

According to the present embodiment, while several persons are watching a specific content using a single display device, if a specific event occurs, a signal indicating the occurrence of the specific event can be transmitted to a mobile terminal of a user who is interested in the specific event only and the display device can be controlled. Therefore, the present embodiment is advantageous in minimizing the interruption in watching the specific content.

Meanwhile, according to one embodiment of the present invention, if an event related to at least two contents occurs in a plurality of external mobile terminals, the controller 1330 can transmit a signal indicating the event occurrence in the at least two contents. This is described in detail with reference to FIG. 22 as follows.

FIG. 22 is a diagram to describe one example of a method of transmitting a signal indicating an event occurrence to a plurality of external mobile terminals from a display device and receiving a command signal for controlling the display device according to one embodiment of the present invention. Regarding the description with reference to FIG. 22, the substance redundant with the foregoing descriptions with reference to FIGS. 14 to 21 shall not be mentioned again and the following description shall be made centering on the differences.

First of all, for clarity of the description of the present invention, a plurality of external mobile terminals A1, A2 and A3 communication-connected to the display device 1300 are described by taking the digital device described with reference to FIG. 3 as examples, by which the present invention is non-limited.

Referring to FIG. 22, the controller 1330 of the display device 1300 can recognize an occurrence of an event related to a personalization information of a specific external mobile terminal among a plurality of communication-connected external mobile terminals.

For instance, while a first content 1610 is displayed on the display unit 1320, if the controller 1330 recognizes that a second content different from the first content is scheduled to be broadcasted on a different channel, the controller 1330 can recognize that an event related to the personalization information of the first and second external mobile terminals A1 and A2 has occurred. In this case, the second content may be included in each of the personalization information of the first external mobile terminal A1 and the personalization information of the second external mobile terminal A2.

In case of recognizing the event occurrence, the controller 1330 can control the communication unit 1310 to transmit a signal indicating the event occurrence to the specific external mobile terminal.

For instance, the controller 1330 can control the communication unit 1310 to transmit a signal indicating the event

occurrence to specific external mobile terminals (e.g., first external mobile terminal **A1** and second external mobile terminal **A2**) related to the event among a plurality of the external mobile terminals **A1**, **A2** and **A3**.

Meanwhile, as each of the first external mobile terminal **A1** and the second external mobile terminal **A2** receives the signal, it is able to output a specific message **1720**. For instance, the specific message **1720** may contain information on a channel scheduled to broadcast the content related to the event, information on a broadcast schedule time of the content related to the event, and an indicator corresponding to a function of switching a channel to the channel scheduled to broadcast the content related to the event.

If a user of the first external mobile terminal **A1** touches the indicator contained in the specific message, the controller **1330** of the display device **1300** can control the communication unit **1310** to receive a command signal for controlling the display device from the first external mobile terminal **A1**.

On the other hand, if a user of the second external mobile terminal **A2** touches the indicator contained in the specific message, the controller **1330** of the display device **1300** can control the communication unit **1310** to receive a command signal for controlling the display device from the second external mobile terminal **A2**.

If the command signal is received, the controller **1330** can control the display device **1300**.

For instance, if a command for ordering to switch the channel to the channel scheduled to broadcast the second content is included in the command signal, the controller **1330** can switch the channel to the channel scheduled to broadcast the second content.

Meanwhile, according to an embodiment, if the command signals are received from the first external mobile terminal **A1** and the second external mobile terminal **A2**, respectively, the controller **1330** can control the display device **1300** in response to the command signal of the external mobile terminal having a higher priority between the first external mobile terminal **A1** and the second external mobile terminal **A2**. For instance, the external mobile terminal having the higher priority may include an external mobile terminal having controlled the display device **1330** most frequently among a plurality of the external mobile terminals or an external mobile terminal having a high priority according to priorities previously saved in the memory.

According to the present embodiment, while several persons are watching a specific content using a single display device, if a specific event occurs, a signal indicating the occurrence of the specific event can be transmitted to a mobile terminal of a user who is interested in the specific event only and the display device can be controlled. Therefore, the present embodiment is advantageous in minimizing the interruption in watching the specific content.

Meanwhile, according to one embodiment of the present invention, as a command signal is received from a specific external mobile terminal, the controller **1330** may control the display unit **1320** to partition a screen and to display at least two contents on the partitioned screen. This is described in detail with reference to FIG. **23** as follows.

FIG. **23** is a diagram to describe one example of a method of displaying at least two contents by partitioning a screen in a display device according to one embodiment of the present invention. Regarding the description with reference to FIG. **23**, the substance redundant with the foregoing descriptions with reference to FIGS. **14** to **22** shall not be mentioned again and the following description shall be made centering on the differences.

First of all, for clarity of the description of the present invention, a plurality of external mobile terminals **A1**, **A2** and **A3** communication-connected to the display device **1300** are described by taking the digital device described with reference to FIG. **3** as examples, by which the present invention is non-limited.

Referring to FIG. **23 (a)**, the controller **1330** of the display device **1300** can recognize an occurrence of an event related to a personalization information of a specific external mobile terminal among a plurality of communication-connected external mobile terminals.

For instance, while a first content **1610** is displayed on the display unit **1320**, if the controller **1330** recognizes that a second content different from the first content is currently broadcasted on a different channel, the controller **1330** can recognize that an event related to the personalization information of the first external mobile terminal **A1** has occurred. In this case, the second content may be included in the personalization information of the first external mobile terminal **A1**.

In case of recognizing the event occurrence, the controller **1330** can control the communication unit **1310** to transmit a signal indicating the event occurrence to the specific external mobile terminal.

For instance, the controller **1330** can control the communication unit **1310** to transmit a signal indicating the event occurrence to a specific external mobile terminal (e.g., first external mobile terminal **A1**) related to the event among a plurality of the external mobile terminals **A1**, **A2** and **A3**.

Meanwhile, as the first external mobile terminal **A1** receives the signal, it is able to output a specific message **1720**. For instance, the specific message **1720** may contain a substance for confirming whether to display the first content and the second content by partitioning a screen of the display unit **1320**.

If a user of the first external mobile terminal **A1** inputs a command for displaying the first content and the second content together by partitioning the screen using the specific message, the controller **1330** of the display device **1300** can control the communication unit **1310** to receive a command signal for controlling the display device from the first external mobile terminal **A1**.

If the command signal is received, the controller **1330** can control the display device **1300**.

For instance, referring to FIG. **23 (b)**, if a command for ordering to display the first content and the second content together by partitioning the screen is included in the command signal, the controller **1330** can partition the screen into a first region **1810** and a second region **1820**. And, the controller **1330** can control the display unit **1320** to display the first content and the second content on the first region **1810** and the second region **1820**, respectively.

Meanwhile, the controller **1330** controls the audio output unit to output audio data related to the first content and is also able to control the communication unit **1310** to transmit audio data related to the 1nd content to the first external mobile terminal **A1**. Hence, the audio data related to the second content can be outputted from the first external mobile terminal **A1** only.

Meanwhile, the display device according to one embodiment of the present invention may control the display unit **1320** to display information on an external mobile terminal communication-connected to the display device. This is described in detail with reference to FIG. **24** as follows.

FIG. **24** is a diagram to describe one example of a method of displaying information on a communication-connected

external mobile terminal in a display device according to one embodiment of the present invention.

First of all, according to one embodiment of the present invention, the controller **1330** of the display device **1300** can control the communication unit **1310** to connect communications with a plurality of external mobile terminals.

Referring to FIG. **24**, when communications with a plurality of the external mobile terminals are connected, the controller **1330** can control the display unit **1320** to display information **1910** on each of a plurality of the communication-connected external mobile terminals. For instance, the information **1910** may include information on a user of a mobile terminal, information on a location of a mobile terminal and the like.

Meanwhile, while the communications with a plurality of the external mobile terminals are connected, if a new external mobile terminal connects a communication, the controller **1330** can control the display unit **1320** to display information **1910** of the mobile terminal.

According to at least one of embodiments of the present invention, it is advantageous in that a user-customized notification can be provided in a multi-user environment. And, it is also advantageous in that a display device can be controlled in a manner of providing a user-customized notification without interrupting a user in watching a currently displayed content.

The WebOS loaded display device and controlling method thereof disclosed in the present specification can be achieved by combination of structural elements and features of the present invention in a predetermined type. Each of the structural elements or features should be considered selectively unless specified separately. Each of the structural elements or features may be carried out without being combined with other structural elements or features. Also, some structural elements and/or features may be combined with one another to constitute the embodiments of the present invention.

A display device operating method disclosed in the present specification can be implemented in a program recorded medium as processor-readable codes. The processor-readable media may include all kinds of recording devices in which data readable by a processor are stored. The processor-readable media may include ROM, RAM, CD-ROM, magnetic tapes, floppy discs, optical data storage devices, and the like for example and also include carrier-wave type implementations (e.g., transmission via Internet). Further, the recording medium readable by a processor is distributed to a computer system connected to a network, whereby codes readable by the processor by distribution can be saved and executed.

It will be appreciated by those skilled in the art that various modifications and variations can be made in the present invention without departing from the spirit or scope of the inventions. Thus, it is intended that the present invention covers the modifications and variations of this invention provided they come within the scope of the appended claims and their equivalents.

The present invention relates to a mobile terminal and a method for controlling the same. Therefore, the present invention has industrial applicability.

What is claimed is:

1. A display device, comprising:

a display unit configured to display a first content;

a communication unit configured to connect communications with a plurality of external mobile terminals; and

a controller configured to:

obtain personalization information corresponding to each of a plurality of the external mobile terminals, wherein the personalization information comprises at least one of a personal content list, a personal application list and a personal advertisement list, recognize an occurrence of an event related to a specific one of a plurality of the external mobile terminals, control the communication unit to transmit, to the specific external mobile terminal, a signal indicating the event occurrence, control the communication unit to receive, from the specific external mobile terminal, a command signal for controlling the display device, wherein the recognizing of the occurrence of the event related to the specific external mobile terminal includes matching the obtained personalization information with received update information comprising at least one of a content, an application and an advertisement, or matching the obtained personalization information with the displayed first content, wherein the updated information is received from an external server by the communication unit.

2. The display device of claim **1**, wherein the controller obtains the personalization information of the each of a plurality of the external mobile terminals by receiving the personal information of the each of a plurality of the communication-connected external mobile terminals.

3. The display device of claim **1**, further comprising a memory configured to store a personalization information of at least one mobile terminal, wherein the controller obtains the personalization information of the each of a plurality of the communication-connected external mobile terminals using the personalization information of the at least one mobile terminal stored in the memory.

4. The display device of claim **1**, wherein when a command signal for ordering to display a second content corresponding to the event occurrence is received from the specific external mobile terminal, the controller is further configured to:

partition a screen of the display unit;

display the first content and the second content on a first region and a second region within the screen, respectively.

5. The display device of claim **4**, wherein the controller outputs audio data of the first content through an audio output unit and controls the communication unit to transmit audio data of the second content to the specific external mobile terminal so that the audio data of the second content is outputted from the specific external mobile terminal.

6. A method of controlling a display device, comprising: displaying a first content on a screen of the display device; performing communications with a plurality of external mobile terminals;

obtaining personalization information corresponding to each of a plurality of the external mobile terminals, wherein the personalization information comprises at least one of a personal content list, a personal application list and a personal advertisement list;

recognizing an occurrence of an event related to a specific one of a plurality of the external mobile terminals; transmitting, to the specific external mobile terminal, a signal indicating the event occurrence; and

receiving, from the specific external mobile terminal, a command signal for controlling the display device,

wherein the recognizing of the occurrence of the event related to the specific external mobile terminal includes matching the obtained personalization information with

47

received update information, or matching the obtained personalization information with the displayed first content,

wherein the updated information comprises at least one of a content, an application and an advertisement, and the updated information is received from an external server by a communication device of the display device.

7. The method of claim 6, wherein the obtaining of the personalization information corresponding to the each of a plurality of the external mobile terminals, comprising obtaining the personalization information of the each of a plurality of the external mobile terminals by receiving the personal information of the each of a plurality of the communication-connected external mobile terminals.

8. The method of claim 6, further comprising saving a personalization information of at least one mobile terminal to a memory, wherein obtaining the personalization information corresponding to the each of a plurality of the external mobile terminals comprises obtaining the person-

48

alization information of the each of a plurality of the communication-connected external mobile terminals using the personalization information of the at least one mobile terminal saved in the memory.

9. The method of claim 6, further comprising:

when a command signal for ordering to display a second content corresponding to the event occurrence is received from the specific external mobile terminal, partitioning the screen of the display device; and displaying the first content and the second content on a first region and a second region within the screen, respectively.

10. The method of claim 9, further comprising:

outputting audio data of the first content; and transmitting audio data of the second content to the specific external mobile terminal so that the audio data of the second content is outputted from the specific external mobile terminal.

* * * * *